FLIGHT

The AIRCRAFT ENGINEER & AIRSHIPS

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Founder and Editor : STANLEY SPOONER

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1927
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Sept. 5 .... **Gordon-Bennett Balloon Race. Detroit, U.S.A.**
Sept. 24 .... **Merseyside Air Pageant, Hooton Park, Lancs.**
Sept. 25 .... **Schneider Trophy Race at Venice.**
Sept. 30 .... **Entries Close for Edward Busk Memorial Prize (R.Ae.S.)**
Oct. 20 .... **Aero Golfing Soc. (Cellon Cup), Walton Heath.**
Dec. 31 .... **Entries Close for R. 38 Memorial Prize (R.Ae.S.)**
1929
Oct. 31 .... **Guggenheim Safe-Aircraft Competition Closes**

EDITORIAL COMMENT.

COMPARED with such exhibitions as the Paris Aero Shows and the Gothenburg Show of 1923, the first International Aircraft Exhibition which opened its doors in the Forum at Copenhagen on Saturday last is somewhat disappointing. Not only is the number of machines exhibited fairly small, but only a single new type is on view, the Bristol two-seater fighter, type 101. This applies to the first two days of the show, and it is believed that by now several more machines will have arrived, as Czechoslovak, French and German aircraft on their way to Copenhagen were held up by exceptionally bad weather conditions along their respective routes and had not arrived at the opening. However, as has been pointed out by our Technical Editor in his article on the Copenhagen Aero Show elsewhere in this issue, a small nation always suffers from a handicap as compared with the great nations of the world, and it is scarcely to be expected that a nation of three million people should be able to equal in magnitude an exhibition organised by a large country. Moreover, the Danes have had no previous experience of organising such an exhibition, and consequently it is scarcely surprising that the Forum in Copenhagen does not contain as much material as does the Grand Palais, for example. In fact, there would be no room in the Forum for 50 or 60 machines, such as one finds at the French aero shows, in spite of the fact that the Forum is known to the good Copenhageners as the giant hall (Kaempehallen) !

The Copenhagen Aero Show

One impression that was prevalent among exhibitors was that what the organisers may have lacked in experience they more than made up for by their courtesy and obvious anxiety to help in every way possible, and as far as the British exhibitors are concerned, the Secretary of the Exhibition, Mr. Paulli Krause-Jensen, and his charming wife (who speaks English perfectly), were at great pains to assist in any and every way they possibly could in smoothing out any difficulties encountered. We are quite sure we are voicing the feeling of the British exhibitors when we extend to them, and to many others of the

organising and business committee, our thanks on behalf of the British contingent at Copenhagen.

The aims and objects of the exhibition were admirably stated at the opening ceremony by Herr Tyge J. Rothe, an ex-Minister for Commerce, who referred to the fact that, although Denmark had not as yet taken a very prominent place in the world of aeronautics, she had contributed her share in the earlier days of flying, when Ellehammer succeeded in getting his machines into the air on the little island of Lindholm. Also, since then Denmark had done her small share, and recently the flight of Botved and Herschend to Tokio and back had made Danish aviation history. But first and foremost, the Copenhagen Aero. Show was to be propaganda for aviation in Denmark, and the organisers had been anxious to create "air-mindedness" among the general population. There had been great difficulties in getting the exhibition going, and an attempt in April last had to be abandoned, partly owing to a clashing of dates with other important events abroad, and partly due to inability to secure exhibitors. At last the exhibition was a *fait accompli*, and although not perhaps as large as could have been wished for, the show was, he thought, very representative.

From discussions with various prominent people in Copenhagen, at the show and outside, we gathered the impression that the organisers were rather disappointed that the British participation is not larger. Denmark transacts a great deal of business with England in agricultural products, and leading political and business people regard it as not only desirable but logical that Denmark should obtain her aircraft material from Great Britain. The question of finances is naturally a serious one, and the price of British aircraft and aero engines has been a stumbling-block in the past. The Danes are, however, if we interpreted their opinions and views correctly, beginning to realise that an article which is somewhat high in first cost is not necessarily the dearest in the long run. The experience of the Danish Navy with British Armstrong-Siddeley engines has been such as to strengthen the desire for British material, and the Hawker "Danecocks" purchased some time ago, and which are now being built in quantities in Denmark under licence, have also given every satisfaction. The robust construction, long life, and low upkeep costs of British aircraft and engines are beginning to be realised, and the ground is, we consider, prepared for sound British air propaganda in Denmark. It would, therefore, have been worth while for a greater number of British firms to have exhibited at Copenhagen, but although this is now too late, there is one way in which there is still time to do something.

On Sunday, September 4, there is to be held at Kastrup aerodrome, in Copenhagen, a series of races and competitions, and we would strongly urge every British firm which can possibly do so to send at least one machine. The prizes are insignificant, but that is of relatively small importance. What *is* important is that the Danes are just getting "air-minded," as evidenced by the fact that on the second day of the exhibition no less than 14,000 people visited the Forum, and September 4 will be a red letter day in the history of Copenhagen. All types of machines will be welcomed, but on our visit to Copenhagen we gathered that the Danes are particularly keen to see a representative collection of British light aeroplanes, such as the de Havilland "Moth," the Westland "Widgeon," the Blackburn "Bluebird," and the Avro "Avian." The Danes' experience of light 'planes is mainly confined to the little 20-h.p. Klemm-Daimler, and we are quite certain that our more powerful machines would meet with general approval. The meeting is being held on a Sunday, as this is the only day on which the aerodrome at Kastrup is available (there being no Sunday air services). Any firm with a seaplane available will, however, always be able to find sheltered spots for starting and alighting in the immediate vicinity of Copenhagen, and the seaplane is a type with a particular appeal to the Danes, who are essentially a seafaring and sea-loving nation. The Danish Navy is using seaplanes of the Hansa-Brandenburg type, with a top speed of about 100 m.p.h. The modern British light aeroplane converted into a seaplane would not be very inferior in performance, and would be a much cheaper machine to run, so that this type should have a great deal to recommend it, and a potential market for British machines of medium and low power might easily be contemplated.

As regards the exhibition itself, the Danish section forms the largest part. Next to that comes the French, which occupies one entire end of the Forum. Owing to the non-arrival of several French machines, however, the French stands were somewhat empty during the first days of the show, although a Farman "Jabiru" and a Morane-Saulnier school machine did their best to fill the gap. A new Farman engine of the inverted "broad arrow" type was the greatest novelty of the French section, and about this we hope to have something to say next week.

Germany is rather poorly represented by a number of scale models of German machines. The German exhibit is, however, a concerted affair arranged by the German equivalent of our S.B.A.C., and but for Treasury refusal to give a small grant, there is little doubt that the British industry would have arranged a very imposing display. As it is, the few enterprising British firms which are showing are doing excellent propaganda for the British aircraft industry in general.

Italy also confines herself to models, and mostly airship models, while Sweden is represented by a huge Junkers monoplane bristling with machine guns. This machine is built under licence by the A.B. Flygindustri, of Limhamn, who have delivered machines of this type to Chile.

Czechoslovakia exhibits a number of aero engines, and some aeroplanes were expected, but up to the time of our departure from Copenhagen these had not arrived.

It seems likely that several European countries will be sending machines, if not to the actual exhibition, at any rate to the competition on September 4, and we would once more urge the advisability of the British aircraft industry sending machines to this meeting. The effect might not, and probably would not be, immediate orders, but we are quite certain that a worthy British representation at Kastrup on September 4 would bear fruit in the future, and would prove a wise and profitable investment, apart from the added prestige which would naturally result.

Therefore, let our slogan be "To Kastrup for September 4."

FLIGHT
AIRCRAFT ENGINEER AIRSHIPS

A NEW BRISTOL FIGHTER—TYPE 101

A British Exhibit at the Copenhagen Aero Show

APART from forming the only British aeroplane exhibited at the Copenhagen Aero Show, the Bristol two-seater fighter-biplane, Type 101, is also interesting in that it is an entirely new product of the Bristol Aeroplane Co., Ltd., of Filton. The family resemblance to the good old "Brisfit," as may be gathered from our illustrations, is still in evidence, but it will also be observed that "modern development" in aircraft design is a prominent keynote. Its general appearance is, in fact, about the most pleasing to the eye that we have come across for some time.

"Fighter 101" is a high performance two-seater fuselage tractor biplane fitted with a Bristol "Jupiter VI" engine. The wings and centre sections—the lower wings, it will be noted, extend below the fuselage, as of old—are constructed entirely of metal, whilst the fuselage is an exceptionally rigid structure of spruce reinforced with plywood. Other important features of the "101" calling for attention comprise the following:—an excellent view is obtained from the pilot's cockpit, while the range of fire for the Lewis gun from the gunner's cockpit is likewise remarkably good; an efficient and sturdy Oleo undercarriage is fitted; an adjustable pilot's seat, an adjustable rudder bar, and positive elevator control make for efficient and easy control; a simple gravity petrol system, and a self-regulating oil cooler are provided.

The wings—which, as previously stated, are of metal construction—are of equal span, with forward stagger and single bay bracing. A feature of their design is the method of mounting the main ribs to the spars by detachable posts. The wing spars are built up of rolled-steel strips riveted together, and are of Bristol standard spar section. Bristol-Frise ailerons are fitted to the lower planes, which give an improved rolling moment and a decreased yawing moment over the whole range of flying speeds. Both lift and landing wires are duplicated, and the compression members are steel tubes; the interplane struts are of the N-pattern.

The tail plane is a wooden cantilever structure mounted on the top of the fuselage, having two spars of the box type of spruce and plywood. Eyebolts, which pass through the front spar and connect to fittings on the fuselage, form a pivot point for the tail incidence adjustment, this adjustment being effected from the pilot's cockpit through a lever (on pilot's right) and cables connected to cranks on a short transverse tube through the fuselage.

The elevators are controlled by a series of three control tubes, which operate a cross tube running through the tail plane. On the ends of this cross tube are crank levers, spigots on the ends of which work in slots cut in the end ribs of the balanced portions of the elevators.

The fuselage consists of a frame structure of spruce members reinforced with plywood and steel-plate fittings. Those bays which are not covered—that is, on the top and bottom of the rear portion of the fuselage—and the internal bays are braced by crossed tie-rods. The vertical and cross struts do not bear directly against the longerons, but the ends are fitted into recesses formed in spruce packing blocks, which are themselves attached to the longerons. A fireproof bulkhead is provided behind the engine section.

A NEW BRISTOL FIGHTER: Two views of the Bristol Type 101 two-seater fighter, fitted with a Bristol "Jupiter VI" engine. This machine is being exhibited at the Danish Aero Show, which opened at Copenhagen on Saturday, August 20.

The pilot's cockpit is located near the top-plane trailing edge, and immediately behind is the gunner's cockpit. This has a Scarff ring, carrying the Lewis gun, mounted on a plywood structure. Both the pilot's seat and the rudder bar are adjustable; a small handle on the side of the seat regulates the height by moving the legs that support the seat, while the rudder bar may be brought near to, or put farther from, the seat without moving any part of the controls.

A V-type undercarriage is employed in which the front struts carry the Oleo absorbers, giving a travel of about 8 ins. The oil piston in each strut has a constant leak, providing a damping of the travel in both directions. Fitted above the oil chambers are compression rubbers and steel springs; compression rubbers are also used in the tail skid.

As previously stated, petrol is fed entirely by gravity; two petrol tanks, of 29 gals. capacity each, are mounted in the top wings, while a third tank, of 20 gals. capacity, is located

in the upper portion of the fuselage immediately behind the fireproof bulkhead. A petrol filter is mounted, at the lowest point of the fuel system, on the front face of the fireproof bulkhead, below the engine mounting.

The oil tank is mounted in the fuselage, below the petrol tank, and underneath it is a self-regulating oil cooler. This latter keeps the oil delivered to the engine at an even temperature by automatically controlling the flow of oil through the cooling space.

The armament of this machine includes two 0·303 Vickers guns mounted on either side of the fuselage, with belt boxes accommodating 1,200 rounds of ammunition, and a Lewis gun mounted on a Scarff ring with five double drums of ammunition; the Vickers' guns are operated by C.C. gear. Provision is made for pilot's and gunner's parachutes, Verey pistol and cartridges, and oxygen apparatus.

The principal characteristics of the Bristol Type 101 are :—

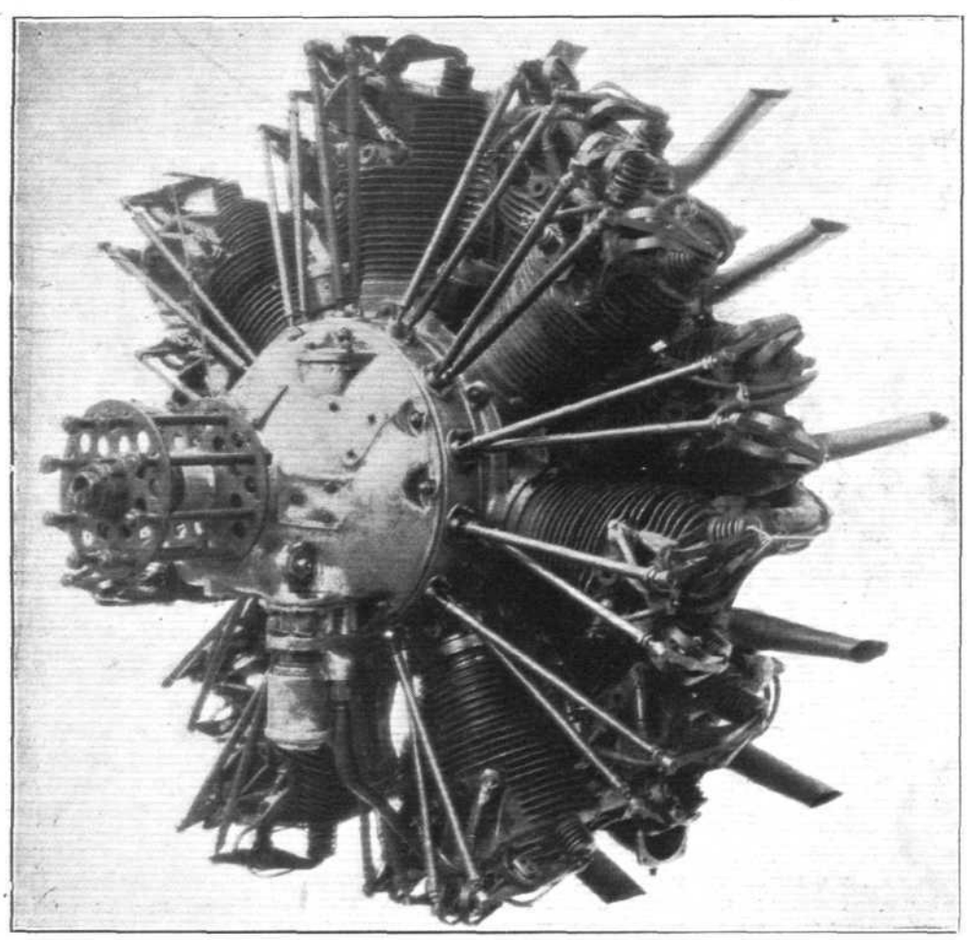
Span (both planes)	33 ft. 7 ins.
Chord ,, ...	6 ft. 0 ins.
Gap	5 ft. 3 ins.
Wing area	320 sq. ft.
Angle of incidence	3°
Dihedral angle	4°
Stagger (at leading edge) ..	3 ft. 0 ins.
Weight empty	2,100 lbs.
Weight laden	3,540 lbs.
Weight per sq. ft.	11·06 lbs.
Weight per b.h.p.	7·85 lbs.
Speed range	60–140 m.p.h.
Climb to 10,000 ft.	9 mins.
Climb to 20,000 ft.	30 mins.
Service ceiling	21,000 ft.

THE INTERNATIONAL AERO SHOW AT COPENHAGEN

By THE TECHNICAL EDITOR

On board s.s. "A. P. Bernstorff," "somewhere in the North Sea," August 23, 1927

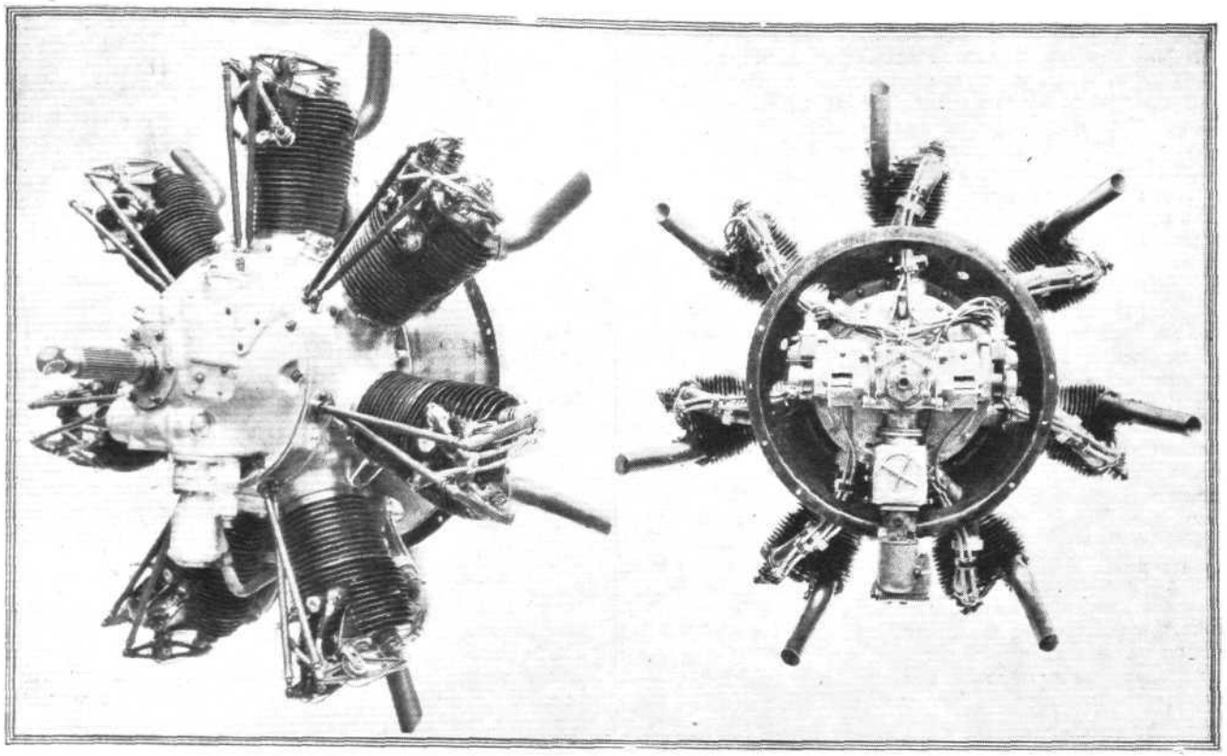
IN almost all respects a small nation is handicapped by its very smallness, a fact which is perhaps likely to be overlooked or at least to be imperfectly realised by the great countries of the world. Denmark for all its efficiency, for all its splendid system of education, its extensive use of co-operative societies, its advanced culture and its generally high standards of living, has not been able altogether to escape the effects of its diminutive size, and in attempting to form an opinion of the International Aircraft Exhibition which opened in Copenhagen on Saturday of last week, August 20, one should, in order to be fair, make every allowance for this fact. Moreover, it should be remembered that this is the first exhibition of its kind to be held in Copenhagen, consequently any shortcomings in the organisation, any traces of amateurishness, should not be treated too severely. We have all had to learn by experience, and from discussions with various exhibitors at the Copenhagen Aero Show it is fairly evident that those responsible for the organisation have, by their extraordinary courtesy, their willingness to meet exhibitors in every way possible, and their obvious anxiety to help, more than made up for such shortcomings due to inexperience as have necessarily been met with occasionally. Bearing all these things in mind, the first international aero show to be held in Copenhagen can be said to form a very good beginning, and although naturally the exhibits do not approach in numbers those of a Paris aero show, or of the Gothenburg show of 1923, the Forum in Copenhagen is well worth visiting during the next week or so.



ARMSTRONG SIDDELEY ENGINES AT THE COPENHAGEN AERO SHOW : The famous 14 cylinder "Jaguar"

It was somewhat unfortunate that we should have decided to visit the exhibition on the first two days, since the already relatively small number of aircraft on view had been further reduced by the non-arrival of several machines from France, Germany and Czechoslovakia, which had been held up by adverse weather conditions *en route*, and by various other causes. However, as far as could be gathered, none of the machines now on their way to Copenhagen is of very novel type, and thus their absence from the list in the present issue of FLIGHT is not really a very serious matter, the more so as the Copenhagen Show should not, we think, be judged so much on the number of aircraft exhibited, as on the fact that our neighbours across the North Sea are beginning to realise the importance of aviation and are anxious to develop among the broader masses of the population that "air-mindedness" which we are doing our best to foster at home.

In order to place before readers of FLIGHT as soon as possible a brief *résumé* of what is to be seen at Copenhagen, these notes are being written under somewhat unfavourable conditions, a strong south-westerly wind having kicked up a rather nasty sea in which s.s. *Bernstorff*, of Det Forenede Dampskibs-Selskab is performing some very peculiar antics and is, incidentally, serving to make one wish all the more for the day when such a hull shall be fitted with wings, making the journey from Esbjerg to Harwich in four hours instead of 24 (or rather 28 as the trip now promises to take owing to the strong head wind), and the worst movement shall be an occasional small "bump" in place of the incessant pitching to which the company is now being subjected. However, FLIGHT goes to press tomorrow night, and consequently these notes have to be written with the writer in a position which is only very occasionally vertical. The rubber "feet" of the editorial "Corona" have a fairly good grip, but even so the machine every now and then performs some

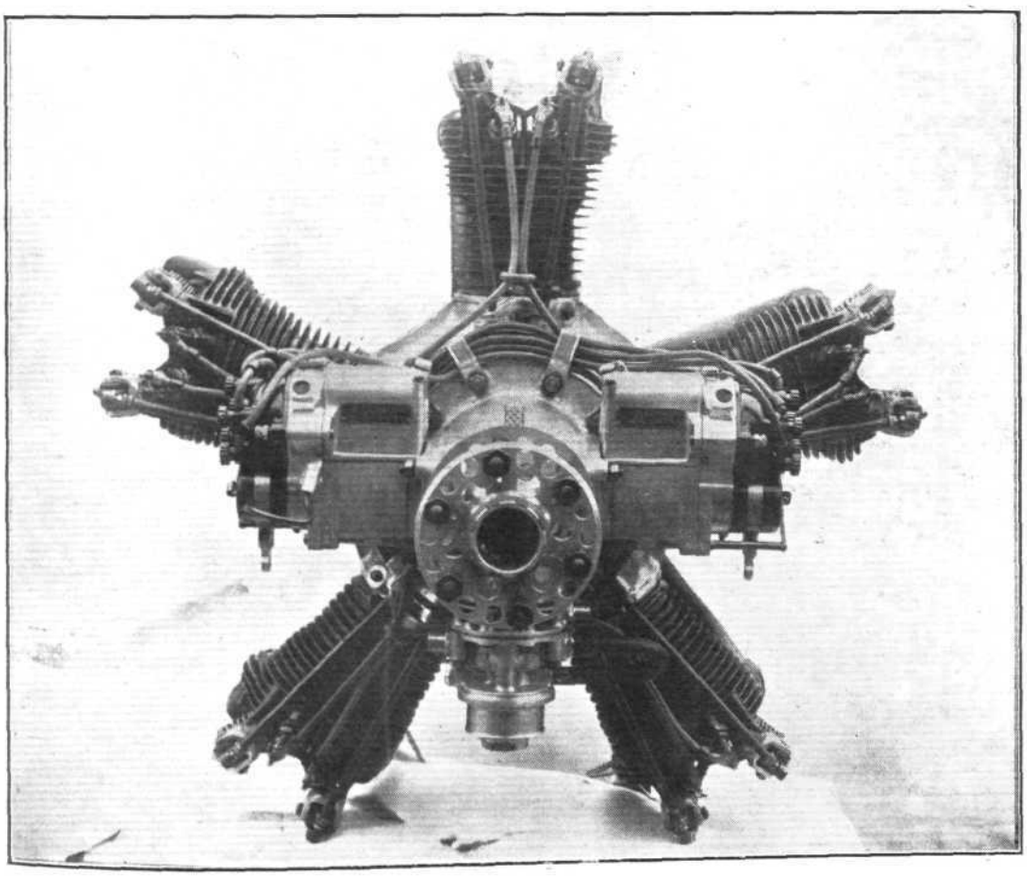


ARMSTRONG-SIDDELEY ENGINES AT THE COPENHAGEN AERO SHOW : The 180-210 h.p. 7-cylinder "Lynx," shown, on the right, with the crank-case cover removed.

distressing side-slips and flat spins which are apt to interfere with any attempt at coherent expression.

The Copenhagen Aero Show, or, to give it its Danish title, Den Internationale Luftfartsudstilling i Kobenhavn, was officially opened on Saturday, August 20, when Herr Tyge J. Rothe, Chairman of the Committee, ex-Minister for Trade and Chairman of the Royal Danish Aeronautical Society, outlined the aims and objects of the exhibition, speaking first in Danish and then giving a *résumé* in English, German and French. Present at the opening ceremony were prominent representatives of the Danish Government, and of the nations participating in the exhibition, Sir Samuel Hoare personally representing Great Britain, having arrived with his party in three flying-boats a short time previously. After the opening ceremony, in which, owing to unavoidable absence, His Royal Highness the Crown Prince of Denmark, who is the patron of the exhibition, was unable to take part, the doors were thrown open to the public, and in a very short time a goodly attendance was to be noted.

Prominently placed just inside the entrance, and the first machine on which one's eye falls on entering the show, is the first Hawker "Danecock" to be constructed under license in



Armstrong-Siddeley Engines at the Copenhagen Aero Show : The "youngest" member of the family, the "Genet," which develops 72-78 h.p.

Denmark. It will be recollected that some time ago the Danish Navy purchased three of these machines from the H. G. Hawker Engineering Company, and at the same time secured the rights for the construction in Denmark of this machine. The specimen exhibited is the first to be constructed by Orlogsvaerftet, otherwise the Royal Danish Naval Dockyard at Copenhagen, under the guidance of Ingenieur Eskildsen, and as far as an external examination indicates, the Danes have made a very excellent job of their first "Danecock," the workmanship and finish of which appear quite up to British standards. The machine exhibited is fitted with the standard Armstrong-Siddeley "Jaguar" engine, but Herr Eskildsen informed us that the second Danish-built "Danecock" is fitted with the super-charged "Jaguar," and will take part in the competitions to be held at the Kastrup aerodrome on Sunday, September 4, when it is hoped that a ceiling greatly in excess of that of the standard machine will be attained. Following are the official Danish performance figures for the Danish "Danecock": Top speed, 235 kms. (146 miles) per hour. 1,000 m. (3,300 ft.) in 2 mins. Ceiling 8,600 m. (29,000 ft.). These figures refer to the machine loaded up to a total loaded weight of 1,330 kgs. (2,925 lbs.). Some FLIGHT photographs of the "Danecock" are prominently displayed on this stand, but unfortunately without acknowledgment.

The second complete machine exhibited on the stand of the Danish Navy is of the Hansa-Brandenburg type which has been used so extensively by the Danish Navy for years, but which is now proving of rather too low power and performance for modern requirements. The machine is known in Denmark as the type I-HMI, and is fitted with a Danish-built engine of 160-175 h.p. built by the Danish Naval Dockyard. It is a six-cylinder in-line water-cooled. The machine is of the well-known low-wing monoplane type with strut bracing from fuselage to wing and wing to twin floats. The latter are of Duralumin in the machine exhibited, although a partly-completed wood float of very excellent workmanship is also shown. With the low power available the performance is naturally not spectacular, but a top speed of 165 km./hr. (just over 100 m.p.h.) is claimed for a total loaded weight of 1,500 kgs. (3,300 lbs.).

In addition to the two complete machines the Danish Navy exhibits various pieces of equipment, parachutes, drogues and camera guns.

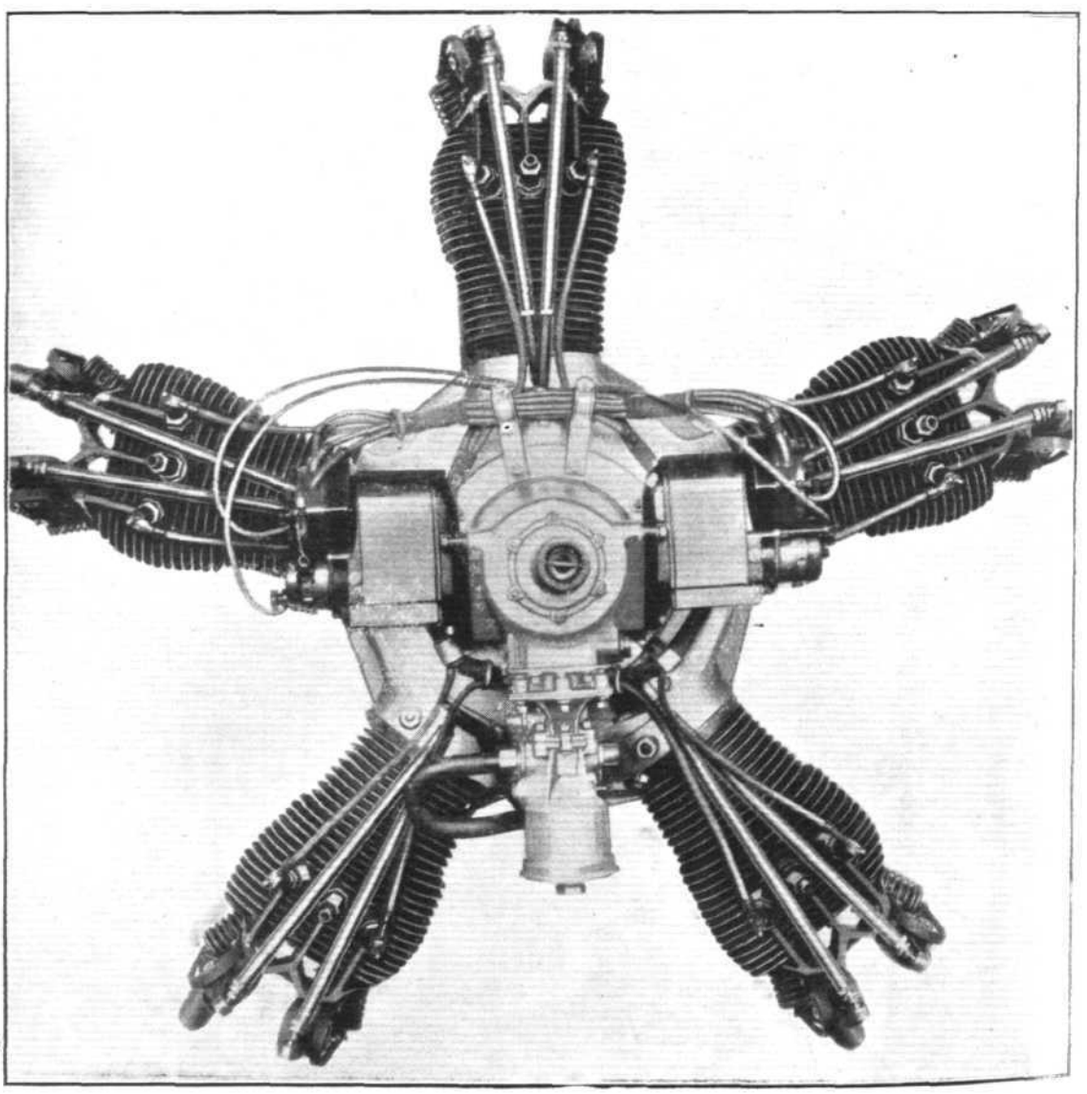
The neighbouring stand is occupied by the Danish Army, who exhibit a biplane which is very similar to the well-known Fokker machines. It is known in Denmark as the type O and has been constructed by Flyvekorpset, or the Danish Army Air Service, and has the typical Fokker wood wings and welded tube fuselage. It is a land machine of straightforward type and does not call for any special comment. The engine is a B.M.W., of which two are shown on the stand, as well as a 400 h.p. Lorraine-Dietrich.

Suspended above this stand is the first monoplane owned by the Danish Flying Corps, the little B. & S. monoplane, built in about 1909 by the two Copenhagen engineers Berg and Storm, and fitted with a little three-cylinder fan type air-cooled engine designed by Mr. Peter Nielsen.

A very complete series of wireless field stations and aircraft stations of Marconi types are also exhibited, as well as some excellent aerial photographs, vertical and oblique, taken by the Danish Flying Corps, who appear to have brought their aerial surveying to a high stage of perfection, as evidenced by a particularly fine aerial photographic map of the environs of the town of Aarhus.

The only other complete machine to be exhibited by a Danish exhibitor is a little Klemm-Daimler with 20 h.p. Mercédès engine, similar to those recently demonstrated at Croydon, when they were described and illustrated in FLIGHT. This machine is now shown under the wing of the huge Junkers bomber built under licence at the Limhamn works of the A. B. Flygindustri. The Klemm-Daimler is the property of the Sportsflyveklubben (Sports Flying Club), to whom it has been presented by Mr. Aller.

A Danish pioneer of flying, Mr. Ellehammer, is represented by a number of photographs of early Ellehammer machines



Armstrong-Siddeley Engines at the Copenhagen Aero Show: The 120 h.p. 5-cylinder "Mongoose."

dating back to his first attempts of 1905 or so, and of some early Ellehammer radial air-cooled engines which are claimed to be the first of this type to be produced.

The English Exhibits

It is a matter for gratification that the only really new machine in the Copenhagen Aero Show should be a British one. This is a Bristol two-seater fighter, type 101, fitted with the Bristol "Jupiter" engine, and created a very favourable impression owing to the obviously practical ideas incorporated in its design. But for the fact that Great Britain is getting away from the use of two-seater fighters, and employing the somewhat modified type for Army co-operation, there is little doubt that the Bristol type 101 would come in for serious consideration. As it is, the machine will scarcely be adopted in Great Britain, but to such countries as use the two-seater fighter the Bristol 101 has many claims to consideration, what with its simple construction, its good performance and its excellent practical qualities. As the Bristol 101 is described and illustrated elsewhere in this issue, it is sufficient here to record its presence and the attention which the machine is attracting from the more discerning visitors to the Forum.

In addition to the two-seater fighter, the Bristol Aeroplane Company is showing a "Jupiter VI" and a "Lucifer IV" engine, both of which are also examined with the keenest interest by the thousands who daily find their way to the exhibition building. As the engines are already well known to readers of FLIGHT, a description of them is superfluous.

A very complete series of aero engines is exhibited on a neighbouring stand by Armstrong-Siddeley Motors, Ltd., who show no less than four different types: the "Jaguar," "Lynx," "Mongoose" and "Genet." Ranging as these engines do from over 400 h.p. down to 85 h.p., a wide choice of types is available, and as the Danish Navy is already using the "Jaguar" and "Lynx," the Danes are familiar with Armstrong-Siddeley engines. Doubtless, when the light 'plane movement spreads to Denmark, as it is bound to do very soon, there will be a demand for the smaller Siddeley engines such as the "Mongoose" and "Genet," the clean design of which is being much admired at the Copenhagen Aero Show.

As the Armstrong-Siddeley engines are already well known to our readers, there is little need for a detailed description of them, but the following brief particulars may be of use for reference purposes. The "Jaguar" is a 14-cylinder radial air cooled with its cylinders arranged in two groups of seven each. The bore and stroke are 125 mm. and 140 mm. respectively, giving a total cylinder capacity of 24·781 litres. The normal speed is 1,700 r.p.m. (400 h.p.), and the engine develops a maximum of 425 h.p. at 1,870 r.p.m. The petrol consumption is 0·56 pint per h.p. per hour, and the oil consumption is 0·025 pint per h.p. per hour. The weight of the engine dry is 355 kg. (778 lbs.).

The "Lynx" may be regarded as one-half of a "Jaguar," in that it has the same cylinders and pistons, but only a single row of seven in place of the 14 cylinders of the "Jaguar." To users of the Siddeley engines it is naturally a great advantage to have the same cylinders and pistons, since the number of spares is greatly reduced. The "Lynx" has the same bore and stroke as the "Jaguar," and the capacity is 12·395 litres, while the power is 180 to 210 h.p. The normal speed is 1,620 r.p.m., and the weight dry 225 kg. (495 lbs.).

The "Mongoose" is the newest type of aero engine to be put on the market by Armstrong-Siddeley Motors, and is a five-cylinder radial, with the following characteristics:—Bore, 127 mm.; stroke, 140 mm.; capacity, 8·85 litres; compression ratio, 5 to 1; power, 125 b.h.p.; normal speed, 1,620 r.p.m.; petrol consumption at normal speed, 7 gallons per hour; oil consumption, 2 pints per hour; weight dry, 153·8 kgs. (337 lbs.).

Produced for the light 'plane competition at Lympne in 1926, the Siddeley "Genet" resembles other Siddeley aero engines in that it is a radial air cooled. It is, however, of somewhat lower power than the "Mongoose," having a bore and stroke of 100 mm. and a capacity of 3·92 litres. Like the "Mongoose," the "Genet" has five cylinders, and develops a normal power of 72 b.h.p. at 1,850 r.p.m. and a maximum of 78 b.h.p. at 2,030 r.p.m. The petrol consumption is 0·575 pints per h.p. per hour, and the oil consumption 0·03 pints per h.p. per hour. The weight dry is 91 kgs. (200 lbs.).

In addition to their very comprehensive series of aero engines, Armstrong-Siddeley Motors exhibit an all-metal wing of the type employed in various Armstrong-Whitworth aircraft. As the only really modern steel wing exhibited in skeleton, this naturally is a centre of attraction among visitors interested in metal construction, and the wing is thoroughly representative of the best British practice in steel wing construction, in which branch Britain can claim to lead the world.

A very fine series of aircraft instruments is exhibited by Henry Hughes & Son, Ltd., of London, comprising almost every imaginable instrument used for air navigation, as well as several ship's compasses, &c. Space does not permit of referring to the instruments in detail here, but we hope at a later date to give some illustrated descriptions of some of the more interesting of these instruments, such as the wind gauge bearing plate, aperiodic and dead beat compasses, &c. In the meantime, it may be stated here that the series of Hughes' instruments is one of the finest in the exhibition.

(To be continued.)

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AERONAUTICAL RESEARCH

Technical Report of the A.R.C, for 1926–7

THE Technical Report of the Aeronautical Research Committee for 1926–7 has just been issued by His Majesty's Stationery Office, and copies may be obtained at 2*s*. each.

For the year under review the Committee report steady progress both in experimental and theoretical work, and, in certain cases, indications of new directions for advance in aeronautical science as the result of research. We give below a brief summary of the contents of many sections contained in the Report.

Stability and Control

A memorandum has been issued to all aircraft designing firms laying down a formula for the rudder volume required to give adequate control. Most important work has been done with improving control at low speeds by the use of the slot-and-aileron-control or large rudders. The former has been tried on various machines and the results show that the device can give adequate control when the machine is stalled. The effect on performance has been measured, and in the case of the Bristol Fighter the reduction of the maximum speed did not exceed 2 m.p.h. A report, R. & M. 1077, by Mr. H. M. Garner, draws attention to the importance of retaining a sufficient dihedral angle, for with this, not only will an aeroplane be less fatiguing to fly, but in some cases (for example, racing aeroplanes), an inadequate dihedral may make an aeroplane dangerous. A study has been made of the Fokker and Hill Tailless aeroplanes as types having good control. At and above the stalling angle of the Fokker machine its flying characteristics are no better than those of a normal aeroplane of the same rudder volume, but, on account of the thick wing employed, more warning of the approach of the stall is given to the pilot. The Hill Tailless aeroplane has been taken up by an aircraft firm, and it is reported that it is quite stable and controllable in flight at large angles of incidence.

Airships

Tests in wind tunnels have been made on models to determine the resistance, stability characteristics, and balance of the controls of the ship now under construction for the Air Ministry with very satisfactory results. The Air Council expressed a desire to be satisfied by the highest possible authority that the principles adopted by the designers in regard to the stressing of the two 5,000,000 cubic ft. airships are as satisfactory as the present state of knowledge permits. A report, in reply, outlined the general principles forming the basis of the required stress calculations and it is understood that the Air Council have made agreeable arrangements to determine the airworthiness of the two ships.

Accidents

In connection with the investigation of accidents, the problem of wing flutter has been examined. In order to reduce the risk of flutter in aeroplanes it appears desirable to design the ailerons so that their centre of gravity comes on the hinge, and to arrange for an appreciable part of the

ailerons to be inside the outer interplane struts. It is probable that a stiffer structure can flutter only at the higher speeds, as wing flutter depends, in part, on the elasticity of the wing structure.

Performance Testing

Much attention has been paid to the analysis of performance tests to the effect of body interference on airscrew performance, and a formula has been deduced for the body resistance due to the slip stream.

Performance

Wind tunnel tests on high-speed seaplanes have been made at the N.P.L. The methods of performance testing have been under review, and a new method put forward by Mr. Capon has been adopted for research purposes, and has been accepted by the industry. Difficulties arose in connection with the adequate calibration of instruments, and have now been overcome. A Martlesham report deals with the power of the normal engine. It has been generally assumed that the engine power was a function of the pressure only; these experiments suggest that a function of the pressure to the two-thirds and of the density to one-third power gives a closer approximation to the truth, and the whole matter has been made a subject for further experiment.

Load Factors for Fin and Rudder

With regard to the proposed Air Ministry memorandum specifying certain minimum requirements for rudder power and volume, in view of the fact that these would, in many cases, involve an increase in the combined area of the fin and rudder, and a consequent increase in the side load on the fuselage, a modification was suggested in the existing formula for calculating the side load, which amounts in effect to a reduction in strength of about 26 per cent. The Design Panel decided there was no definite evidence supporting the assumption that fuselages calculated by present methods are unduly strong, and that unless the larger fin and rudder involved a serious addition to the structure weight if the existing formula was retained, it would not be advisable to authorise the proposed modification in estimating rudder loads.

Comparison between French and British Methods of Stressing

An opportunity will probably occur for making comparative strength tests on a certain machine by both French and British standard methods.

Tractor and Pusher Airscrews

A paper on this subject reports that, provided that efficient nacelles are designed, there is no reason to believe that pusher airscrews will be less efficient than tractors.

Vortex Theory of Airscrews

In recommending a report on this subject the Vortex Panel stated that careful consideration had been paid to all available evidence, and the conclusion reached that the vortex theory of airscrews had reached a stage where it can be applied to design with confidence.

Scale Effect

The Society of British Aircraft Constructors has suggested that in connection with full-scale testing of wings of different form, accurate results could be more rapidly obtained if, instead of using a Bristol Fighter for the purpose, as at present, a parasol monoplane could be constructed, capable of incorporating any particular wing section which it is desired to test.

High-Speed Aircraft

The question of further increasing the maximum speed obtainable in high-speed machines has been dealt with. During the test of a particular model in a tunnel, a surprising increase of lift coefficient was found over that of the wings alone, which was attributed to the fairing of the wings into the fuselage delaying the development of stalling of the centre section. With regard to engine drag, it seems possible that for racing machines, the air-cooled engine will not compare favourably with a water-cooled engine using wing radiators.

Airscrews Working at High Tip Speeds

Tests made on aerofoil sections at speeds up to twice the velocity of sound suggests that the shape of the most efficient aerofoil for use at such speeds differs considerably from that suitable for the ordinary range.

Autogiro

Further work on this type of machine has proved that the performance in top speed and rate of climb was not so good as that of a standard Avro of the same weight and with the same engine. But the advantages of the Autogiro, that is, its low minimum gliding speed and its ability to land at steep angles, were fully demonstrated.

Instruments

An instrument has been developed which records the true angle of flight path of an aeroplane independently of atmospheric currents. It is important, as a means of eliminating the effects of air currents on the full-scale measurements of lift and drag. The design of an instrument as a recording angular accelerometer for certain experiments on stalled flight has been recommended.

Fire Prevention

Progress in this direction is difficult, owing to the lack of exact knowledge as to the causes which lead to the ignition of the petrol vapour set free in a crash. In the case of single-engined machines, it is certain that the fireproof bulkhead between the engine and pilot has resulted in a saving of life on more than one occasion. The problem is more difficult in multi-engined machines. The fireproof bulkhead should be fitted if one engine is in the fuselage, and in the case of the engines on the wings, the petrol tanks should be placed so that petrol will not fall near an outlet of the exhaust. Fire risk may be lessened appreciably when a heavier fuel is used. Research is proceeding on the development of engines to burn heavy oils. Attention is being given to the recommendation of a type of fire extinguisher capable of use with one gloved hand and readily operative.

Elasticity and Fatigue

At the N.P.L., the previous experiments on the deformation and mechanism of failure of single crystals under static and repeated stresses is being extended to include specimens consisting of several large crystals. At the R.A.E., a fundamental theory associating failure of metals under static and repeated stresses with complex phase changes is being further developed and subjected to critical experimental tests. Prof. Jenkin, of Oxford, is continuing high-frequency fatigue experiments. Prof. Mason is investigating the correlation between the endurance limit and the cyclic strain of specimens subjected to reversed bending stresses. Prof. Lea is working on the failure of metals under combined stresses. A report by Messrs. Gough and Wright, of the N.P.L., gives an investigation into the crippling strength of thin sheet metal used in aircraft construction.

Light Alloys

The use of magnesium alloys for aircraft purposes is being steadily developed, and these alloys appear to offer great possibilities. Some have excellent rolling and forging properties. Corrosion is a difficulty, but marked improvement has been obtained in more recently prepared material.

Engines

Problems of detonation and fuel economy become increasingly important. It is possible to run the high compression and supercharged engine on "doped" fuels, but this involves the search for more suitable dopes than are at present available. With airship engines, pending a general review of compression-ignition engine research, the use of gaseous fuels is being considered.

◈ ◈

Col. Minchin Ready

COL. MINCHIN brought his Fokker monoplane over from Amsterdam on August 18, accompanied by Mr. Leslie Hamilton, and went on to Bristol to have the "Jupiter" tuned up. They are attempting the Atlantic flight shortly.

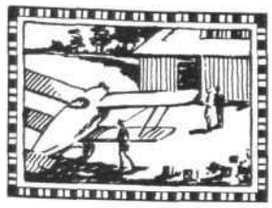
Tunbridge Wells Air Pageant

THIS was postponed on August 20 owing to bad weather. It will take place on August 27. The Mayor (Alderman Charles Westbrook) and Sir Robert Gower, M.P., President of the proposed club, will make flights. "Moths" will take part in the meeting, and formation flying will be given by the R.A.F.

Convenience of Flying

MR. NORMAN HULBERT, Secretary of the National Fund for the Promotion of Aeronautics, found it necessary to get to the West of England rather quickly, and the De Havilland Company loaned him a "Moth" on very reasonable terms for the purpose. He reached Shrewsbury from London in about 1 hr. 10 mins., and for the double journey, the petrol consumption was about eight gallons.

FLIGHT & AIRCRAFT ENGINEER AIRSHIPS

PRIVATE  FLYING

A Section of FLIGHT in the Interests of the Private Owner, Owner-Pilot, and Club Member

AIR TRAVEL ACROSS EUROPE

Mrs. Eliott-Lynn's Latest Tour

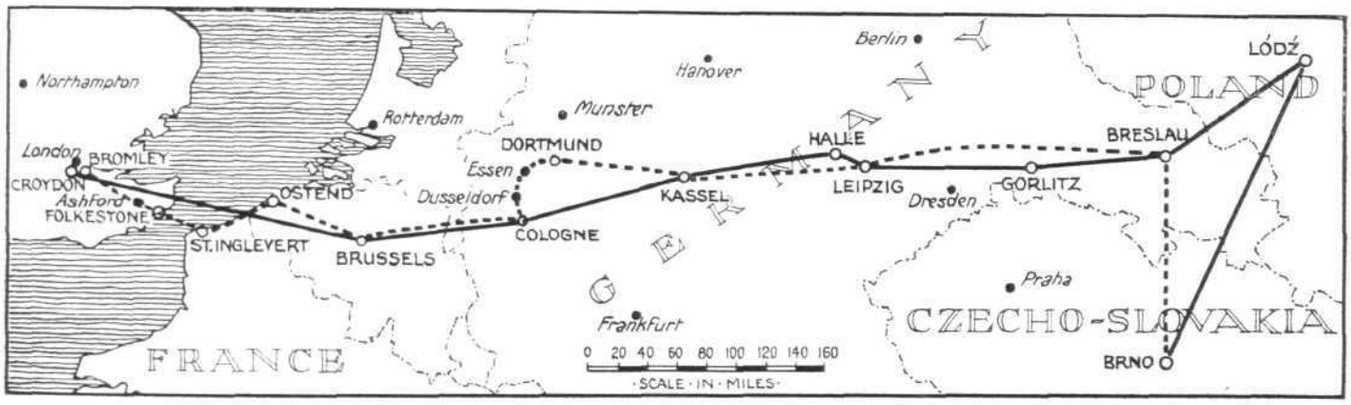
MRS. ELIOTT-LYNN and Mr. Hollindrake, a member of the Lancashire Aero Club, recently made an air tour through Central Europe in the former's "Avian." It is interesting for the glimpses it reveals of air travel in Europe and particularly in Germany. It seems that the light aeroplane is quite an innovation in some parts of Europe in comparison to its rapidly-growing popularity in this country. The start of the trip was on August 2, and after reaching Brussels in a non-stop flight of 2 hrs. 40 mins., and landing there for petrol, they went on to Cologne, taking 1 hr. 30 mins. The Lufthansa staff there were very interested in the "Avian," and many indulged in joy-rides. For the next lap to Kassel the Rhine mountains were crossed at an altitude of 5,000 ft., and at this town a German aircraft factory was visited. Leipzig was the next important stage, Halle being touched on the way. The local aeroplane club were very interested in the air travellers and again much joy-riding took place. In return for their pleasure the joy-riders offered hospitality for the night. The next day Breslau was reached via Görlitz, the first half of this section taking 2 hrs., and the latter half, 1 hr. 30 mins. The day after Mrs. Eliott-Lynn was asked to give an exhibition of aerobatics over the town in connection with the athletic meeting then proceeding. To visit this was part of the object of her tour. Here, many prominent inhabitants were taken up.

Local Hostility

There next followed something of an adventure. On August 5, they went on to Lódz, in Poland, but not having permission to fly in Poland, and being apprehensive of a possible scrutiny of their passports if they landed on a Polish aerodrome, a landing was effected in a field outside the town; but it proved to be an excellent choice from an aeronautical point of view only. Noticing a group of peasants in a cart trundling along a road running beside the field, Mrs. Eliott-Lynn decided to ask them to post a letter; but suddenly a horde of "natives" appeared from all directions, exhibiting war-like intentions. They came on brandishing sticks! Mr. Hollindrake quickly taxied the "Avian" into a good "take-off" position, whilst Mrs. Eliott-Lynn delivered her letter and then sprinted the hundred yards back in record time. When they lifted into safety, the "enemy" were near enough to make the escape a near thing. In the afternoon a landing was made in another field near Brno, in Czecho-Slovakia, but the inhabitants of the district here were more docile towards an aeroplane. The mountains were perilously near this hayfield and at her best climbing angle, the "Avian" just managed to get away.

Return Flight

Their return flight across Europe from Brno and Breslau is indicated by the dotted line on our map. It proved impossible to get over the Rhine mountains owing to low clouds, and after returning to Kassel, four attempts were made to detour north, the last at an altitude of only 30 ft. After abandoning the attempts for two hours, they tried again in clearer weather, but were soon brought down below the hill summits, making a forced landing in a valley. They eventually got through by going north-west and reaching Dortmund. A night was spent at Cologne, and eight o'clock in the morning proved too early to get petrol in Brussels. But they got it at Ostend, then bad weather sent them to St. Inglevert for a weather report before crossing the Channel. The sea flight was made at 150 ft. Beyond Folkestone conditions were so bad that even at 30 ft. it was impossible to get through. Finally, the tour ended in a forced landing on Bromley golf links. The most direct course between stages was not followed, and a total of about 2,500 miles was thus covered during the whole tour.



EUROPEAN AIR TOUR: The thick line indicates the outward course of Mrs. Eliott-Lynn's air tour and the dotted line the return flight. She was accompanied in her "Avian" by Mr. Hollindrake, a member of the Lancashire Aero Club, and at Lodz, in Poland, they were threatened by a hostile hord of "natives," from whom they escaped in the nick of time. Mrs. Eliott-Lynn made a record sprint of 100 yards whilst her companion got the "Avian" ready for the hasty "get-away"

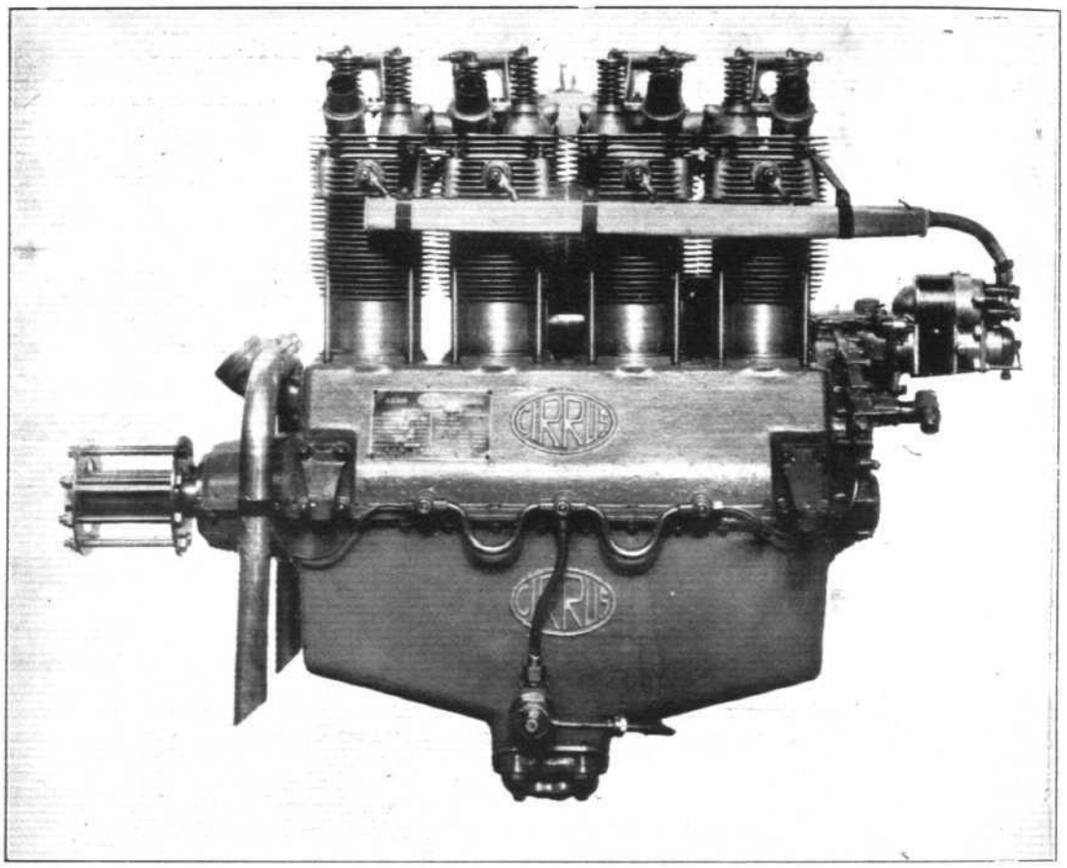
German Hospitality

Commenting on her tour, Mrs. Eliott-Lynn said that wherever the German Lufthansa air lines were encountered she was always treated as a guest, although part of this hospitality included rising at unearthly hours in the morning to see her off. Their aerodromes, she says, are wonderfully well kept. The air liners depart at the signal of a steward who waves a red or green flag. She noticed, as a remarkable fact, that at the civil aerodromes no pilot did anything except long straight glides-in or straight "take-offs." She was told at Leipzig that pilots are not taught to do turns in the air. They apparently find out by experience, which does seem very remarkable. Instead of spending half-an-hour in the air for a lesson, the pupils have only two or three minutes, making one circuit, and then they are taught landings and ascents straight away. Sixty flights are made with an instructor and thirty alone before they take their tickets. They have to pass eight examinations: medical, practical flying, cross-country, navigation, map reading, meteorology, engine work and machine work. One or two qualified pilots who flew with Mrs. Eliott-Lynn were very excited when she put the machine into vertical banks. A fee of 2*s.* 6*d.* is charged for landing at civil aerodromes, and another fee of 2*s.* 6*d.* for "taking-off." All the air lines are illuminated by aerial lighthouses, and there are over 170 aerodromes in daily use. Spare machines are always in readiness to preserve the continuity of the services. . . .

THE "CIRRUS" MARK II ENGINE

The A.D.C. Aircraft, Ltd., have issued a neat and attractive publication dealing comprehensively with the care and maintenance of the A.D.C. "Cirrus" (Mark II) engine. This type of aero-engine is used so extensively by the clubs and private owners that this book really becomes an essential item in aeronautical literature, although the simple and orthodox nature of the design makes this engine very easy to understand and run. It has no complications and, therefore, nothing beyond simple instructions are required. These are clearly put forward in this little book, and amplified with illustrations, both photographic and diagrammatic. The Mark II is specially designed to meet the requirements of light aeroplanes, and it embodies improvements gathered after experience with the Mark I, which increase the reliability and lessen the cost of maintenance. Nothing can constitute an improvement in an engine, particularly in this class, without these two characteristics.

Improvements: The new A.D.C. "Cirrus" Mark II engine has been designed to meet the special requirements of light aeroplanes, and incorporates new features, as the result of experience with Mark I, which increase the reliability and lessen the cost of maintenance.



Contents

The Mark II is a 30/80 h.p. engine developing its maximum horse-power at 2,000 r.p.m. It is a vertical four-cylinder air-cooled stationary type. The book gives a complete specification of the engine, and then follows with brief and compact paragraphs dealing with cylinders, valves and valve gear, pistons, connecting rods, crankshaft, crankcase, camshaft, induction manifold, lubrication, oil pressure, ignition, and the carburettor. The type of carburettor fitted is the "Claudel Hobson" (R.R.C.H.), and a cross-sectional elevation of this is shown, and it is minutely described. The instructions on dismantling, examination and assembly of the engine, are detailed at some length, and this is so with running instructions. In the latter case the difficulties of starting up are dealt with, giving common faults and their remedies. Under the heading of "Maintenance" it advises removal of the heads and cylinders for top overhaul every 100 hours, and lifting the oil baffles on these occasions for an inspection of the interior condition of the engine. The engine should be stripped down for a complete overhaul after 300 hours' running. To facilitate examination for wear a table of clearances allowed on the working parts (when new) is given. All private owners should possess a copy of this handy volume.

Aerodromes of England

In publishing our map of the Aerodromes of England last week, we pointed out that private owners and others could help to complete this map. We are pleased to acknowledge the valuable information that has been sent in as a result, and we shall publish it in due course. Meanwhile, we hope it will be augmented by further information.

Duchess of Bedford's Tour

The Duchess of Bedford has returned from her latest air tour with Captain C. D. Barnard as pilot. In a week, 3,500 miles were covered; the Alps were crossed at 14,000 ft., the Riviera fires were seen, and the machine felt the effects of passing closely to a waterspout while flying along the coast, near Naples. The water could be seen being sucked up from the sea, and the "bumps" were severe. The Lido was visited, and the return flight passed *via* Nice and Paris.

The Hawker "Cygnet" Mishap

The attempt of Flight-Lieut. R. L. Ragg to set up the long-distance record for light planes ended in a crash at Lympne as he was trying to ascend. He was flying the R.A.E. Club's Hawker "Cygnet," and had originally intended to reach North Africa. He had been waiting at Lympne for some time for favourable weather, and at last decided to make for Bucharest. Owing to the very "soggy" nature of the ground, the machine took rather a long run before getting off, but it got well clear of the telegraph wires. Then a strong down current of air caught the "Cygnet" and forced it into them, with the result it crashed. Fortunately, the pilot escaped injury.

"Avian" for South Africa

In order to foster private flying in South Africa, the Shell Petrol Company of South Africa have purchased an Avro "Avian," which they are presenting to the South African Aero Club. This they promised to do if the Government would grant the Club a subsidy. This has been done. The "Avian" was taken over by the Shell Company at Woodford Aerodrome, Cheshire, on August 23. It is painted in gold and lined with brilliant red, with the red "shell" on the side. These are the familiar aviation colours of the Shell. The registration letters are G-UAAC, and it is the third civil aeroplane to be registered in the colony.

The AIRCRAFT ENGINEER

FLIGHT ENGINEERING SECTION

Edited by C. M. POULSEN

August 25, 1927

CONTENTS

EDITORIAL VIEWS

It is always refreshing to obtain "outside" views on matters aeronautical, and unless one does obtain these there is danger of staleness. Although this applies, perhaps, less in technical subjects, the columns of THE AIRCRAFT ENGINEER are willingly opened to other than British designers, since there is generally something to be learned from studying new problems, or old ones presented in a new form. Under the latter category comes the article on Aeroplane Performance, by Mr. Ivan H. Driggs, publication of which commences in the present issue. Mr. Driggs states, in a letter to the Editor accompanying the article, that he has read with great interest the series of articles on Aircraft Performance by Mr. J. D. North, and the article is an attempt at making use of the Prandtl theory in developing a simple theoretical method of analysing and predicting aeroplane performance.

Mr. Driggs was the designer of the little Driggs-Johnson light monoplane which was described and illustrated in FLIGHT of November 13, 1924, and he has worked for some considerable time at the American Government establishment at McCook Field, so that he may be assumed to have made a thorough study of the subject of performance. The article is of such length that it has been necessary to divide it, but in the latter portion of the paper a comparison is given between actual measured performances of known machines and performances calculated by the author's simplified method, from which it appears that the agreement is good, and the accuracy probably as great as that of measuring actual performances in flight. We shall be glad to have the views of British designers and readers in general on the Driggs method of performance calculation.

Span $^2/W$ is by way of becoming a cult these days, and Mr. J. D. North, in his excellent series of articles on Aeroplane Performance, has repeatedly called attention to the importance (and limitations) of this ratio. In this issue we publish a chart showing what the ratio really involves. From this it will be seen that only for fairly light machines is it practicable to obtain a large value of this ratio. For heavy machines the spans involved soon become impractical, as the curves clearly show.

A SIMPLE THEORETICAL METHOD OF ANALYSING AND PREDICTING AIRPLANE PERFORMANCE.

By IVAN H. DRIGGS.

Introduction

The formulæ given in this report are intended first to show the relation of certain fundamental variables to absolute ceiling and to rate of climb, and second to allow an estimate to be made for these quantities with but a minimum of calculation. The methods of performance calculation in use at present (except the Empirical-Theoretical curves) are rather laborious in that the curves of horsepower available and horsepower required have to be completely calculated and drawn for at least two altitudes. This labour is unnecessary, since we are interested in but three points in each of the above curves namely, the power required and available at high speed, maximum ceiling and best rate of climb. These curves of power may be expressed by algebraic equations to a very close approximation from which we are able to calculate the co-ordinates of each of the above points. When these co-ordinates are known, the procedure for determination of high speed, rate of climb and ceiling follows standard practice. Such a calculation represents actual conditions only in so far as the mathematical expressions closely approximate the actual curves in question. From the work to follow, it will be seen that the results obtained are probably as accurate as the flight test figures with which they are compared. We, therefore, are justified in presenting the following formulæ for general use.

Throughout this report every effort is made for simplification It is endeavoured to use standard symbols for the different quantities, and so to use suffixes that every algebraic expression will be definitely connected in meaning with the item which it represents.

Fig. 1 shows a pair of typical curves of power required and power available, for which algebraic equations are derived.

$$P_a = P \text{ (motor)} \times \text{propeller efficiency} = P_m \times e = \text{power available} \quad \ldots\ldots (1)$$

$$P_r = \frac{\text{Resistance} \times V}{375} = \frac{RV}{375} = \text{power required} \quad \ldots\ldots (2)$$

The resistance of the airplane (R) is made up of two quantities, the induced drag and the parasite drag. The parasite drag includes the frictional drag of the wings, as well as the resistance of structural parts.

$$R = D_{Ind.} + D_{Par.} \quad \ldots\ldots (3)$$

$$D_{Par.} = 0{\cdot}00327\, A_p V^2 \text{ at ground} \quad \ldots\ldots (4)$$

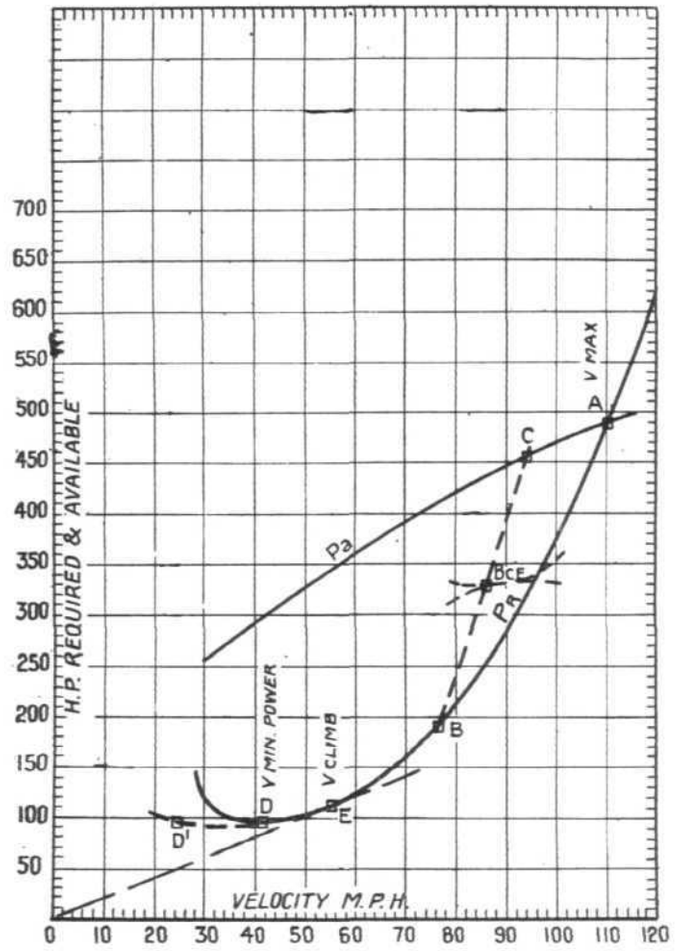


Fig. 1. Typical Curves of Power required and Power available.

Where A_p = The area of a flat plate which has the same resistance as the wing profile drag plus all the structural items and tail surfaces.

$$D_{Ind.} = \frac{125\ W^2}{(K_b S)^2\ V^2}$$ (fundamental Prandtl equation)

W = Total weight of airplane.

S = Span of wings.

K_b = Coefficient which raises the span of a biplane to the equivalent monoplane span and depends upon ratio of gap to span. This quantity is given by the curve of Fig. 2.

Substituting in equation 2.

$$P_R = \left(0{\cdot}00327\ A_p V^2 + \frac{125\ W^2}{(K_b S)^2 V^2}\right)\frac{V}{375} \quad \ldots\ldots (6)$$

$$= 0{\cdot}00000872\ A_p V^3 + \frac{W^2}{3(K_b S)^2 V} \quad \ldots\ldots (7)$$

Now $P_a = P_m \times e$. ..... (1)

As the speed changes, both the propeller efficiency, e, and the motor power, P_m, change. The revolutions of the motor, and also the efficiency decrease as V decreases. These two variations, tending to reduce the power available, may be grouped into one quantity, overall efficiency, e_o. H. C. Watts has given a number of curves of overall efficiency in "Design of Air Screws." e_o may be expressed approximately by—

$$e_o = e_{max.}\left(\frac{V}{V_{des.}}\right)^{1/2} \quad \ldots\ldots (8)$$

When $V_{des.}$ = Velocity at which propeller is designed to absorb the power of the motor at the required revolutions.

Let $K_p = \left(\frac{V}{V_{des.}}\right)^{1/2}$ ..... (9)

Then $P_a = P_m e_{max.} K_p$ ..... (10)

Mr. F. W. Herman uses a curve for maximum propeller efficiency which gives very excellent results in practice. This curve can be expressed quite accurately, between all limits in use, by the expression :—

$$e_{max.} = \frac{1 - 0{\cdot}425\ P_m^{1/6} N^{1/3}}{(V_{des.})^{5/6}} \quad \ldots\ldots (11)$$

Where N = Revolutions of propeller at $V_{des.}$

Summary

The curves of Fig. 1 are expressed approximately by :—

$$P_R = 0{\cdot}00000872\ A_p V^3 + \frac{W^2}{3(K_b S)^2 V} \quad \ldots\ldots (7)$$

$$P_a = P_m e_{max.} K_p \quad \ldots\ldots (10)$$

When $e_{max.} = \frac{1 - 0{\cdot}425\ P_m^{1/6} N^{1/3}}{(V^{des.})^{5/6}}$ ..... (11)

and $K_p = \left(\frac{V}{V_{des.}}\right)^{1/2}$ ..... (9)

MAXIMUM VELOCITY

Referring to Fig. 1, it is seen that the maximum speed obtainable is at the point "A" where the curves P_a and P_r intersect. That is,

Where $P_a = P_r$.

Then at $V_{max.}$

$$P_m e_{max.} K_p = 0{\cdot}00000872\ A_p V_{max.}^3 + \frac{W^2}{3(K_b S)^2 V_{max.}} \quad \ldots(12)$$

It is convenient to consider all terms of the above equation as fractions of the total weight, W.

Then

$$\frac{P_m}{W} e_{max.} K_p = 0{\cdot}00000872\ \frac{A_p}{W} V_{max.}^3 + \frac{W}{3(K_b S)^2 V_{max.}} \quad (12a)$$

Let $\frac{P_m}{W} = F_p$, the power factor (inverse of power loading)

$\frac{A_p}{W} = F_r$, the parasite resistance factor.

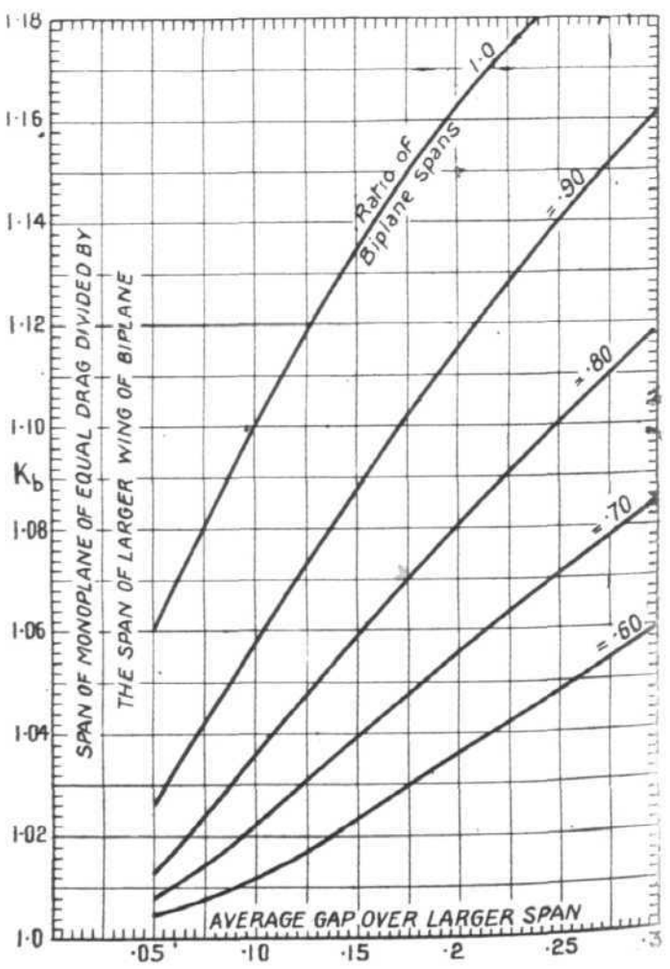


Fig 2. Values of Coefficient K_b for various Biplanes.

$\frac{W}{3(K_0 S)^2} = F_i$, the induction factor (induced power per lb. at unit V).

$$\text{Then } F_p e_{max.} K_p = 0{\cdot}00000872\, F_r V_{max.}^3 + \frac{F_i}{V_{max.}} \quad \ldots\ldots (13)$$

$$\frac{F_p}{F_r} e_{max.} K_p V_{max.} - \frac{F_i}{F_r} = 0{\cdot}00000872\, V_{max.}^4 \quad (13a)$$

An equation in this form can be very readily solved for $V_{max.}$ when the remainder of the quantities are known. The left side of formula (13*a*) is a linear in $V_{max.}$. The right side varies as $V_{max.}^4$. Any two points determine the curve of the linear portion, while $\cdot 00000872\, V_{max.}^4$ can be easily plotted out. (See Fig. 3) By assuming any value of V a solution for the left-hand portion is obtained. Plotting any two such points as ordinates on their respective values of V as abscissæ and connecting by a straight line to intersect the curve will give the value of $V_{max.}$ desired. Fig. 3 has been included in this report for that purpose. This procedure will be more clear from the examples to follow at the end.

If it is desired to calculate F_r from a flight test, where $V_{max.}$ is known, the following form is most convenient :

$$F_r = \left(F_p e_{max.} K_p - \frac{F_i}{V_{max.}} \right) \frac{1}{0{\cdot}00000872\, V_{max.}^3} \quad (13b)$$

MAXIMUM CEILING

We are indebted for the following proof to the excellent book on "Aeroplane Performance Calculations," by Mr. Harris Booth. The only change lies in the difference in symbols.

It is well first to define "Ceiling." Ceiling is that height at which the rate of climb is zero. There is a ceiling corresponding to every point in the curve of power required. It is important to determine the maximum of these ceilings or, as it is sometimes called, the "absolute ceiling."

Consider any point B, Fig. 1, which has the co-ordinates $V_B, -(P_R)_B$.

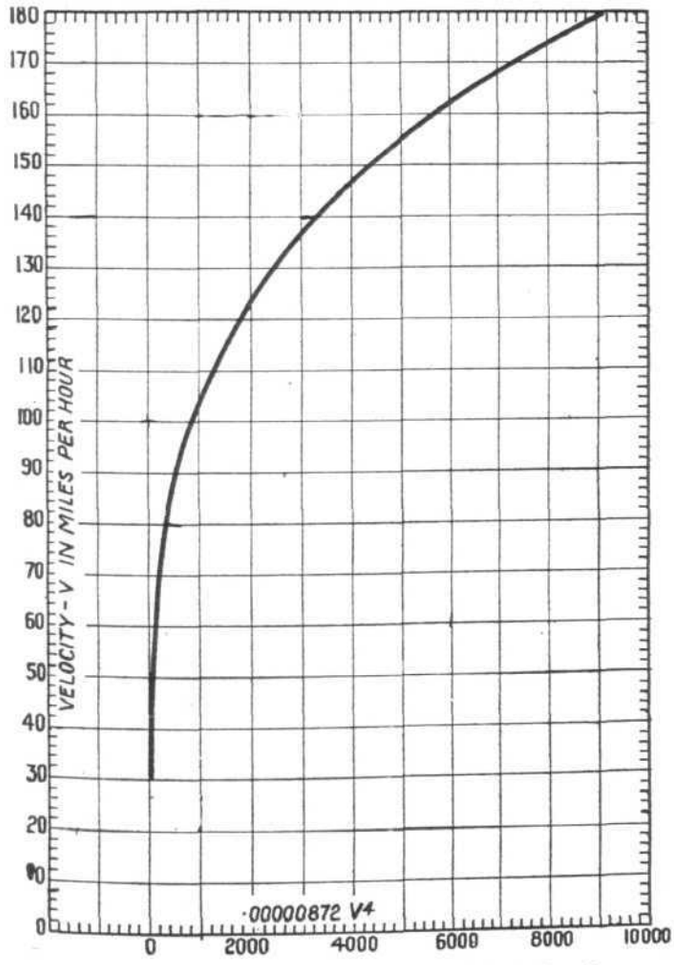


Fig. 3. Curve for the Determination of High Speed.

At the ceiling of this particular point

$$(V_B)_{CE} = \frac{1}{\sqrt{d_r}} V_B \quad \ldots\ldots (14)$$

Where d_r = relative density of the air at altitude.

$$\text{and } [(P_R)_B]_{CE} = \frac{1}{\sqrt{d_r}} P_{RB} \quad \ldots\ldots (15)$$

That is, point B has moved upward and to the right and takes the position substantially as shown by B_{CE} Fig. 1.

Since $P_a = P_r$ at ceiling this point B_{CE} may be considered as also lying on the curve of P_a at ceiling.

$$\text{Now, } (V_{pa})_{CE} = V_{pa} \sqrt{\frac{P_r}{d_r}} \quad \ldots\ldots (16)$$

Where P_r = relative power of motor at altitude.

$$\text{and } (P_a)_{CE} = P_a P_r \sqrt{\frac{P_r}{d_r}} \quad \ldots\ldots (17)$$

$$\text{also } (V_B)_{CE} = V_{pa} \sqrt{\frac{P_r}{d_r}} \quad \ldots\ldots (16a)$$

$$(P_{RB})_{CE} = P_a P_r \sqrt{\frac{P_r}{d_r}} \quad \ldots\ldots (17d)$$

Since power required and power available are equal at ceiling.

That is some point, such as C, Fig. 1, on the curve of power available has moved downward and to the left so as to coincide with B_{CE}.

Substituting the co-ordinate of B_{CE} into equations 16*a* and 17*a* the co-ordinates of point C are derived.

$$\frac{1}{\sqrt{d_r}} V_B = V_C \sqrt{\frac{P_r}{d_r}} \quad \ldots\ldots (18)$$

$$\frac{1}{\sqrt{d_r}} P_{RB} P_{ac} P_r \sqrt{\frac{P_r}{d_r}} \quad \ldots\ldots (19)$$

$$V_c = V_B \frac{1}{\sqrt{P_r}} \quad \ldots\ldots (18a)$$

$$(P_a)_C = P_{RB} \frac{1}{\sqrt{P_r^3}} \quad \ldots\ldots (19a)$$

The maximum ceiling occurs very near that velocity which makes P_r a minimum, that is at point D, Fig. 1.

Differentiating P_r (equation 7) against V and placing that differential equal to zero one finds :

$$V_{MP} = \text{Velocity of Min. Power} = 14 \left(\frac{F_i}{F_r} \right)^{1/4} \quad \ldots (20)$$

and P_r min. $= 0{\cdot}095\, F_i^{3/4} F_r^{1/4} W$

$$\therefore P_a = \frac{0{\cdot}095\, F_i^{3/4} F_r^{1/4} W}{P_r^{3/2}} \quad \text{From (19}a\text{)}$$

$$F_p e_{max.} K_{pCE} = \frac{0{\cdot}095\, F_i^{3/4} F_r^{1/4}}{P_r^{3/2}} \quad \ldots\ldots (21)$$

$$(V_{pR}) = \frac{V_{Mp}}{P_r^{1/2}} \quad \ldots\ldots (18a)$$

$$(K_p)_{CE} = \left[\frac{(V_{pR})}{V_{des.}} \right]^{1/2} = \left(\frac{V_{Mp}}{V_{des.}} \right)^{1/2} \frac{1}{P_r^{1/4}} \quad \ldots\ldots (22)$$

$$(K_p)_{CE} = \frac{1}{P_r^{1/4}} K_p, \text{ when } K_p = \left(\frac{V_{MP}}{V_{des.}} \right)^{1/2}$$

$$\text{Then } F_p e_{max.} \frac{K_p}{P_r^{1/4}} = \frac{0{\cdot}095\, F_i^{3/4} F_r^{1/4}}{P_r^{3/2}}$$

$$\text{and } P_r^{5/4} = \frac{0{\cdot}095\, F_i^{3/4} F_r^{1/4}}{F_p e_{max.} K_p} \quad \ldots\ldots (23)$$

If the value of P_r is calculated from equation (23), and if the variation of motor power with altitude for the given engine is known, we may definitely determine the absolute ceiling.

The above holds true for every case when the speed of minimum power as given by equation (20) is greater than the

stalling speed of the particular airplane. If V_{MP} is less than $V_{min.}$ (see point D', Fig. 1) obviously, flight cannot be maintained and the ceiling as calculated from equation (23) will not be realised.

To take care of this condition it is necessary to return to the fundamental expressions and retain V in the equation.

$$\text{Then } P_r^{5/4} = \left(0{\cdot}00000872\ F_r V_{mp}^3 + \frac{F_i}{V_{MP}}\right)\frac{1}{F_p e_{max.} K_p} \quad (24)$$

The symbols have the same meaning as before except that V_{MP} is no longer given by the formula (20). An arbitrary approximate value of V_{MP} for this condition is $1{\cdot}1\ V_{min.}$ This expression was derived by inspection of a number of performance calculations which had been previously made by the old detail method.

$$\therefore V_{MP} = 1{\cdot}1\ V_{min.} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (25)$$

In order to determine into which case any particular design falls we must first apply the expression deduced below.

$$V_{MP} = 14\left(\frac{F_i}{F_r}\right)^{1/4} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (20)$$

$$\text{and } V_{min.} = \sqrt{\frac{W}{A_w K_{y\ max.}}}$$

But from (25)

$$V_{MP} = 1{\cdot}1\ V_{min.}$$

$$\therefore \frac{14\ F_i^{1/4}}{F_r^{1/4}} = 1{\cdot}1\sqrt{\frac{W}{A_w K_{y\ max.}}}$$

$$196\frac{F_i^{1/2}}{F_r^{1/2}} = \frac{1{\cdot}21\ W}{A_w K_{y\ max.}}$$

$$A_w = \frac{K_b S\ A_p^{1/2}}{93{\cdot}6\ K_{y\ max.}} \quad (26)$$

A_w = Total wing area.

$K_{y\ max.}$ = Maximum total lift coefficient full scale.

If the wing area is less than that given by equation (26), formula (24) must be used—otherwise formula (23).

Summary

(Absolute Ceiling)

Case I when

$$A_w => \frac{K_b S\ A_p^{1/2}}{93{\cdot}6\ K_{y\ max.}}$$

$$P_r^{5/4} = \frac{0{\cdot}095\ F_i^{3/4} F_r^{1/4}}{F_p e_{max.} K_p} \quad (23)$$

$$K_p = \left(\frac{V_{MP}}{V_{des.}}\right)^{1/2} \qquad V_{MP} = 14\left(\frac{F_i}{F_r}\right)^{1/4}$$

Case II when

$$A_w < \frac{K_b S\ A_p^{1/2}}{93{\cdot}6\ K_{y\ max.}}$$

$$P_r^{5/4} = \left(0{\cdot}00000872\ F_r\ V_{MP}^3 + \frac{F_i}{V_{MP}}\frac{1}{F_p e_{max.} K_p}\right) \quad (24)$$

$$V_{MP} = 1{\cdot}1\ V_{min.}$$

$$K_p = \left(\frac{V_{MP}}{V_{des.}}\right)^{1/2}$$

Both cases

$$e_{max.} = 1 - \frac{0{\cdot}425\ P_M^{1/6} N^{1/3}}{(V_{des.})^{5/6}}$$

$$F_p = \frac{P_M}{W}$$

$$F_r = \frac{A_p}{W}$$

$$F_i = \frac{W}{3(K_b S)^2}$$

(To be continued.)

TECHNICAL LITERATURE.

SUMMARIES OF AERONAUTICAL RESEARCH COMMITTEE REPORTS.

THE SPINNING OF AEROPLANES.

By S. B. GATES, M.A., and L. W. BRYANT, B.Sc., A.R.C.Sc

R. & M. No. 1001. (Ae. 242.) October, 1926.

This monograph is a comprehensive survey of recent work in this country on the subject of spinning. No general study of spinning has been made since the issue of R. & M. 618* in 1918; since then a great deal of further information from model and full scale sources has accumulated, and much solid progress has been made in fundamental parts of the subject. It is the object of the authors to put on record the present state of our knowledge regarding the geometry and mechanics of the steady spin and the evidence on which that knowledge is based, together with speculations which can reasonably be advanced regarding the character of the as yet unanalysed motions of the entry to recovery from the steady spin.

The work is divided into eleven chapters, and an endeavour has been made to provide for several classes of reader. It is suggested that those readers who are interested in practical conclusions rather than in analyses may find all they require in the first three chapters. The first of these gives an elementary survey of the problem using only the simplest mathematics; the second summarises the history of the subject, and the results of full scale experience of the spin; whilst the third anticipates the analysis which follows, and collects the practical conclusions and recommendations which can be drawn from it. In Chapter IV the theory of the steady spin is elaborated, and is followed in Chapter V by the application of the theory to two contrasted aeroplanes whose aerodynamic properties have been measured in fair detail in the wind tunnel. Detailed discussions of aerodynamic questions which appear to be fundamental to the problem are given in Chapters VI to IX. The questions dealt with are (1) the autorotative properties of monoplanes and biplanes, (2) the couples due to sideslip, (3) the action of the controls, and (4) the influence of the running airscrew. Chapter X contains a summary of the technical conclusions from the mathematical analysis. The report concludes in Chapter XI with a short reference to future developments. A bibliography and full index are appended.

The sources from which the material for the study has been drawn are mainly pilots' evidence, full scale observations, and wind tunnel experiments. The testimony of pilots regarding the spinning properties of many different aeroplane types has been collected from time to time. In the best circumstances this evidence would fall short of precision, and it is not surprising that the complicated and confusing character of the spinning motion seriously detracts from the normal scientific value of a personal impression. Pilots say that the majority of aeroplanes can be made to fall into a fast spin by some action of the lateral controls—some indeed have been observed to spin at moderate rates with lateral controls held neutral. Some outstanding types attain very high rates of rotation in a spin, from which recovery is dangerously slow. On the other hand a few types have been very reluctant to spin even with full rudder and ailerons. Besides these variations among the different types, we gather that an aeroplane has moods in its spinning behaviour, and spins of different individual aeroplanes of the same type show marked differences, whilst spins of even the same aeroplane are often notably different on different flights and in the hands of different pilots. We have every reason to suspect that equilibrium conditions in a steady spin are very sensitive to some factors which are as yet only imperfectly understood. It should be remarked, however, that there is no unique motion which could be called *the* spin of a given aeroplane; the steady spin is strictly a function of the control settings, and has infinite gradations from the "tight" or fast spin to a spiral glide of large radius at an incidence just above stalling. There is no evidence that the steady spin is usually reached in practice, when it is seldom that the manœuvre is continued

* R. & M. 618. The investigation of the spin of an aeroplane.—H. Glauert.

much beyond four turns. In fact the most recent flying experience on more than one type indicates that the difficulty of recovery increases with the number of turns, and records of angular velocity on the Bristol Fighter show that this aeroplane creeps towards a spin of high rate of rotation and large incidence. It may be, therefore, that many aeroplanes show a slow progression toward an equilibrium position in a "flat" spin if left to spin for a large number of turn with the stick hard back and the rudder hard over; and classification into "short" spins, easily recovered from, and "long" spins from which recovery is difficult, may prove to be useful in explaining current flying experience in spins and in guarding against the danger of a prolonged manœuvre.

The mathematical work of the report attacks only the simplest of the problems involved: the steady spinning motion. It rests upon the pioneer work of Lindemann, Glauert, and Harris, and is a natural extension to their theories in the light of later wind tunnel work. In the earlier investigation side slipping was left out of account; later experiments have confirmed the opinion that the amount of sideslip, although probably small in a spin, is of the first importance in the balance of aerodynamic couples. The influence of the inertia of the spinning aeroplane in giving rise to a pitching moment tending to maintain high incidence is explained in detail. Further light has been thrown on the behaviour of the tail unit in a full spin by model experiments on a rolling balance, and emphasis is laid in this report on the importance of small adjustments in disposition and area of fin, tailplane, rudder and elevators in determining the ultimate character of a spin and the ease or difficulty of recovery. There are peculiar mutual interferences between the various parts of the tail unit, particularly at large angles of incidence. A careful study is made of such data as exists, and the anomalous behaviour of certain machines has been to a large extent explained. The insight into the mechanics of the motion of the steady spin given by the analysis is sufficient to warrant also some speculations as to what is happening in the motions of entry and recovery.

An explanation of the observed differences between spins to right and to left is given. Estimates of the gyroscopic and aerodynamic couples due to the rotating airscrew indicate that the former is chiefly a pitching couple of appreciable magnitude, and the latter a yawing couple which may be of significance in certain cases. It appears that when the rotations of the spin and of the airscrew are in opposite senses, both these couples help to produce a higher rate of spin at higher incidence than when the rotations are in the same sense.

If it be admitted that there is no case for trying to abolish the spin from the flying *régime*, the problem of safety requres that it should be easy for a pilot (*a*) to avoid spin following a stall, and (*b*) to recover quickly from a voluntary spin. The first requirement forms the subject of R. & M. 1000, the report by the Stability and Control Panel on Control of Stalled Aeroplanes. It is there shown that conventional ailerons must be replaced by a type of control which produces as nearly as possible a pure rolling couple about the chord axis, and that the slot-and-aileron control is likely to be an adequate solution. We do not yet know definitely whether this new type of control will also help to ensure safe recovery from an established spin; it apparently does so in the case of Avro 504K.

The problem of safe recovery from an established spin includes the question of what factors in design lead to abnormally fast spins at abnormally large angles of incidence. The analysis of the steady spin leaves little doubt as to the general influence of a number of points in design, although no simple exact rules can be laid down for the avoidance of characteristics which would lead to danger in spinning. The following are the main considerations which indicate the nature of the precautions to be taken in order to ensure reasonable safety in recovery from spins.

(1) *The Moments of Inertia.*—Fast spins always occur at angles of incidence much greater than can be maintained in straight flight by the elevators alone, and at such incidences the pitching couple due to the wings tends to reduce incidence. There is, however, a couple due to centrifugal forces on the rotating body which tends to increase incidence, and comes into play as soon as rotation starts. The rotation is increased by the autorotation effect combined usually with outward sideslip on the turn, whilst the inertia couple leads to further growth of incidence; this is the cumulative process mainly responsible for the establishment of rapid spins. The inertia couple can be reduced by avoiding as far as possible the spread of heavy weight along the body at a distance from the C.G.

(2) *Arrangement of Biplane Wings.*—Every test which has yet been made on the effect of variation of stagger on biplanes shows that as positive stagger is reduced, the spinning properties of the biplane grow more dangerous. This is firstly because the autorotation range of incidence and the rates of autorotation are greatly extended, and, secondly, because the stable slope of the pitching moment curve against incidence (characteristic of stalled wings) becomes reduced over a critical range of incidence (30° to 60°). Zero or backward stagger should therefore in general be avoided, unless special attention is paid to other precautions necessary for safety.

(3) *The Position of the Centre of Gravity.*—Although backward movement of the C.G. has probably in general a comparatively small adverse effect on pitching moment and elevator control at a given incidence above the stall, there are good reasons for believing that in some types of aeroplane it may lead to grave danger in spinning. In these aeroplanes a small change in the balance of pitching couples may be sufficient to account for the passing of the spin into regions of higher incidence and faster rates of rotation, from which recovery is much more difficult and uncertain. Further, the choice of a forward position of the C.G. will increase the degree of longitudinal stability below the stall; and this, while undoubtedly quite ineffective in some predicaments (such as engine failure while climbing) which lead to an involuntary passage beyond the stall, and hence to the incipient spin, may in others have a beneficial effect. For these reasons the C.G. should be kept forward where possible, and if it is further back than 0·35 of the chord, special attention should be paid to other features of the design in order to counteract the adverse effects which may be expected.

(4) *The Controls.*—Pilots seem to be unanimously of the opinion that conventional ailerons have no appreciable effect on the motion of recovery. This cannot be accepted if it means that ailerons are inoperative at all stages of the spin. It has been found that the B.E.2C and the Bristol Fighter settle down into very different spins, according to the sign of the aileron setting; and the faster spins are those in which the ailerons are set *against* the spin. The inference from this is that it is the yawing moment due to the ailerons which is most powerful in its effect, probably because it is a comparatively large quantity amongst a group of small and erratic yawing moments. It is this adverse yawing moment which renders the ailerons inefficient, and often accounts for the fact that the "crossing" of the controls (rudder and aileron) may make recovery easier.

But for the present the burden of recovery must be laid on rudder and elevator. These have never been designed with an eye on the couples they may have to supply in recovery from a spin—partly, no doubt, because the magnitudes of these couples were quite unknown. By a happy accident, until the last few years the controls have been found just sufficient to ensure recovery if properly used. The margin of safety was not large, and of late years new types have been introduced in which the margin has dwindled to vanishing point. It is not possible at present to put forward a minimum figure for elevator and rudder power in relation to the spinning of any given aeroplane; nor could a designer work to it if it could be stated. There is, nevertheless, strong argument in favour of an increase in rudder and elevator control over that which is regarded as adequate for normal flight requirements, in any case in which the design includes features which point to danger in spinning. The need for increased area in the tail unit is a consequence mainly of the reduction of efficiency at large angles of incidence; the tail is subject to shielding by the fuselage, which assumes serious proportions when the

fuselage is very thick, and it also works in the wash from the rotating wings. Further, experiment has shown that the tailplane shields the fin and rudder in a very fast spin at high incidence, and may reverse the sign of the damping couple due to them. It is anticipated that adequate control could with sufficient knowledge be provided by an intelligent disposition of surfaces with little increase of area; but for the present, recommendation is made to increase the area of both elevators and rudder by 30 per cent. above that deemed satisfactory for normal flight control.

Full-scale work on spinning has developed at the R.A.E. into an experiment which is, perhaps, the most elaborate which has yet been undertaken, and it is still only in its tentative stage. From a set of perfect observations it is now possible to describe the motion (assumed steady) fully, and to analyse the total aerodynamic force. The full-scale experiment allows no direct insight into the aerodynamic couples; we must rely on models for this. The conditions of a fast spin are shortly to be reproduced in the wind tunnel, and it is hoped to make extensive measurements of forces and couples which will permit a detailed analysis of the spin in all its stages to be attempted. All these researches are lengthy and laborious, and some time must elapse before substantial progress can be made.

COMPARISON OF ATALANTA AND MODEL SEAWORTHINESS AND FORE AND AFT ANGLE.

By the Staffs of the MARINE AIRCRAFT EXPERIMENTAL ESTABLISHMENT, Felixstowe, and the WILLIAM FROUDE NATIONAL TANK, National Physical Laboratory.

R. & M. No. 1076 (9 pages and 9 diagrams). July, 1925. (Approved for publication, December, 1926.) Price 1s. net.

The purpose of the investigation was to compare the behaviour of the Atalanta N.4 flying boat and that of a model $\frac{1}{12}$ full size as regards spray and general running.

The full-scale tests took the form of cinematograph films of spray, and measurements of transverse inclination and running angle at different speeds. The model was tested upright and with lateral angles of 2° and 4°.

The results of the tests showed that the agreement between model and machine was generally satisfactory, but suggest that in future large machines should be tested for cleanness at a lateral angle corresponding to that feasible on the machine, to determine the best position for wing struts.

Further comparison work is in hand on the speed and conditions which produce porpoising, the tests being made on the Seagull flying boat.

REPORTS AND MEMORANDA OF THE AERONAUTICAL RESEARCH COMMITTEE PUBLISHED BETWEEN THE 1st JANUARY, 1925, AND THE 28th FEBRUARY, 1927.

R. & M. No. 1050. (8 pages.) February, 1927. Price 4*d.* net.

The Aeronautical Research Committee publish a list of Reports & Memoranda for each hundred. Previous lists of the Committee are R. & M. Nos. 650, 750, 850 and 950 and, with the present R. & M. 1050, give a complete list of all the published papers.

For a classified list of reports on sale as separate issues with prices see List "B," for which application should be made to H.M.S.O.

WIND TUNNEL EXPERIMENTS ON A SYMMETRICAL AEROFOIL (GÖTTINGEN 429 SECTION).

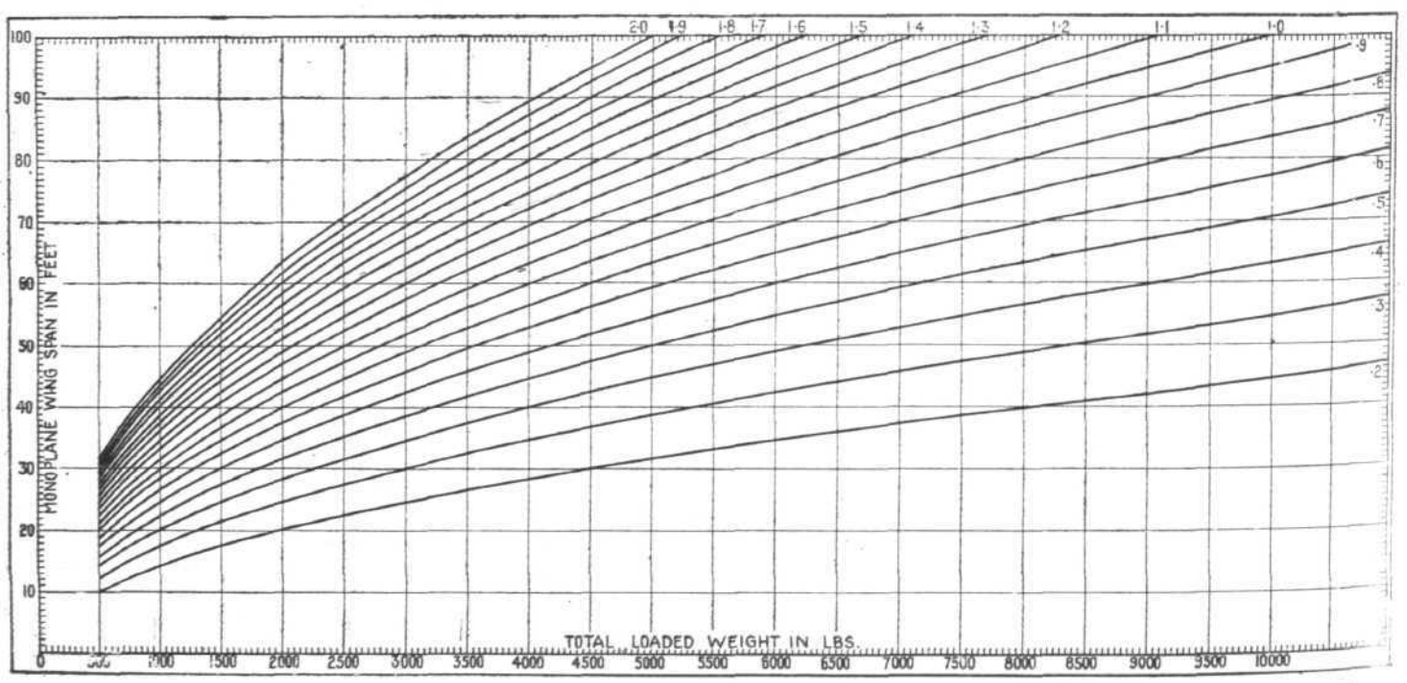
By C. N. H. Lock, M.A., H. C. H. Townend, B.Sc., and A. G. Gadd.

R. & M., No. 1066 (Ae. 248). 20 pages and 6 diagrams. November, 1926. Price 1s. net.

Two models of the symmetrical aerofoil section Göttingen 429 of 4-in. chord and 18-in. chord, each of aspect ratio 6, have been tested over a range of tunnel speeds giving a total range of VL from 10 to 150. The object of the tests was to provide data for strip theory calculations on the Cierva Autogiro, which has blades of this section.

The minimum drag coefficient has reached a practically constant value of 0·0050 at the highest scale. The maximum lift coefficient increases from 0·43 at VL 20 to 0·58 at VL 120 and appears to be still increasing rapidly at the latter scale value. It is, however, possible that the maximum lift of the aerofoil of 18-in. chord may be appreciably in error owing to tunnel interference.

These Reports are published by His Majesty's Stationery Office, London, and may be purchased directly from H.M. Stationery Office at the following addresses: Adastral House, Kingsway, W.C. 2; 28, Abingdon Street, London, S.W.1; York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; or 120, George Street, Edinburgh; or through any bookseller.



SPAN ^{2}/W: Mr. J. D. North has called attention to the importance of this ratio, and to the reasons why a high value is difficult to attain in heavy machines. These curves have been prepared to show exactly what proportion of span and weights are involved to obtain various ratios. The figures marked against the curves are the span ^{2}/W ratios. The manner in which span increases with increase in weight is well brought out, and it is not difficult to see why large modern commercial aeroplanes have low values of span ^{2}/W (average figure 0·3 to 0·5). The curves correspond to monoplane spans. Biplane spans, to give the same ratio of Lift/Induced Drag, are smaller, the conversion being carried out as explained by Mr. North in our issue of April 29, 1926.

FLIGHT
THE AIRCRAFT ENGINEER AIRSHIPS

LIGHT 'PLANE CLUBS

London Aeroplane Club, Stag Lane, Edgware. Sec., H. E. Perrin, 3, Clifford Street, London, W.1.
Bristol and Wessex Aeroplane Club, Yate, Gloucester. Sec., C. S. Clarke, Channel Road, Walton Park, Clevedon, Somerset.
Hampshire Aeroplane Club, Hamble, Southampton. Sec., Maj. Ross White, Hamble, Southampton.
Lancashire Aero Club, Woodford, Lancs. Sec., C. J. Wood, Oakfield, Dukinfield, near Manchester.
Midland Aero Club, Castle Bromwich, Birmingham. Sec., Maj. Gilbert Dennison, 22, Villa Road, Handsworth, Birmingham.
Newcastle-upon-Tyne Aero Club, Cramlington, Northumberland. Sec., A. H. Bell, c/o The Club.
Norfolk and Norwich Aero Club, Mousehold, Norwich. Sec., H. O. Bennett, 5, Opie Street, Norwich.
The Scottish Aero Club Movement, 101, St. Vincent Street, Glasgow. Sec.: Harry W. Smith.
Suffolk Aeroplane Club, Ipswich.—Secretary, Courtney N. Prentice, "Hazeldell," Stowmarket, Suffolk.
Yorkshire Aeroplane Club, Sherburn-in-Elmet, Yorks. Sec., J. F. Barnes, 39, Swan Arcade, Bradford.

LONDON AEROPLANE CLUB

THE flying time for the week ending August 14, 1927, was 25 hrs. 25 mins.
Pilot Instructors.—Captain F. G. M. Sparks, Captain S. L. F. St. Barbe.
Dual instruction.—J. H. Veasey, J. H. Percy, W. L. M. O'Connor, R. G. Whalley, E. V. Brodrick, Col. Farfan, E. L. Clarke, Dr. Cook, P. W. Hoare, Miss Spooner, Miss O'Brien, R. P. Cooper, L. C. Davey, H. F. Wight, G. M. Randall, W. J. Bernhard, G. H. Saxon-Mills, W. M. Gossip, F. C. Fisher, W Hay.
Solo Flying.—Miss Spooner, Miss O'Brien, O. J. Tapper, E. T. Symons, W. Hay, E. L. D. Moore, J. J. Hofer, E. E. Stammers, R. P. Cooper, L. C. Davey, S. O. Bradshaw.
Passenger Flights.—E. V. Haslam, A. Hay, Miss Hay, C. F. Watts, W. R. Simeons.

Flying Time.—The total flying time for the week ending the 21st inst. was 25 hrs. 35 mins.
Pilot Instructors.—Capt. F. G. M. Sparks and Capt. S. L. F. St. Barbe.
Dual Instruction.—E. K. Broderick, G. Black, H. S. Greenland, L. C. Fisher, S. Pritchard-Barrett, L. W. Gibbens, L. Martin, W. L. M. O'Connor, E. E. Fresson, S. W. Radbone, R. G. Whalley, J. G. Crammond, J. H. Percy, J. H. Veasey, R. L. Portway, M. P. Susman, E. L. Clarke, B. B. Tucker, M. D. Hamilton, Miss Wilson, Col. Farfan, F. C. Elford, A. S. Richardson, Dr. Cook, Mrs. Cook.
Solo Flying.—D. H. P. Esler, E. E. Fresson, F. G. Crammond, E. T. Symmons, R. L. Portway, L. W. Gibbens, A. F. Wallace, B. B. Tucker, J. J. Hofer, Sqdn.-Ldr. M. Wright, J. Pritchard-Barrett.
Passenger Flights.—Mrs. Pritchard-Barrett, G. H. Black, R. N. Gregor, S. Simon, L. C. S. Pool.
G-EBKT Accident.—On Sunday afternoon Pilot Officer Stanley Pritchard-Barrett, flying on D.H. "Moth" G-EBKT with his wife as passenger, crashed just outside Stanmore. The pilot and passenger were both taken to the hospital, and the extent of the injuries are not yet known. The club "Moth" is apparently a complete write-off.
Two Years' Record.—The London Aeroplane Club has now been in existence two years, and the following results have been achieved :—

	Total Flying Time.
First year, ending July, 1926	1,153 hrs. 15 mins.
Second year, ending July, 1927	1,747 hrs. 50 mins.

Seventy-nine of its members have held Air Ministry licences.
Fifteen members who have been trained *ab initio* by the club have acquired their own aeroplanes, and at the present time there are 20 aeroplanes privately owned by members of the club.

BRISTOL & WESSEX AEROPLANE CLUB

TOTAL flying time for week ending August 13, 17 hrs. 45 mins. Dual with Mr. Bartlett : Miss H. Pitman, Miss O. Miles, Messrs. R. S. Clarke, C. H. Brewer, H. H. Bromham, F. J. Bishop, A. H. Downes-Shaw, A. Hall, J. Pitman, P. Pitman, A. E. Russell, H. A. Tiarks, Welch. Solo : Mr. E. Hopper, 10 mins. Solo with passenger, Mr. C. Shaw, 20 mins.
The club received visits from representatives of the *Western Daily Press* who were entertained and given flights. One cross-country flight was undertaken by Mr. H. A. Tiarks and Mr. Bartlett.
The "Brownie," kindly presented by the Bristol Aeroplane Company, was received during the week. The weather has not been favourable for flying.

THE total flying time for the week ending August 20 was 11 hrs. 55 mins.
Dual with Mr. Bartlett.—Miss Miles and H. Pitman, Messrs. H. H. Bromham, Capt. F. S. Barnwell, A. H. Downes-Shaw, R. A. Hall, J. Pitman, P. Pitman, H. A. Tiarks, J. H. Gilchrist. Solo.—Mr. E. Hopper, 30 mins. Passenger.—Mr. E. Hopper and Mr. Maggs. Flying was impossible on Monday and Saturday.

HAMPSHIRE AEROPLANE CLUB

WEEK ending August 21.—The club was closed from Monday, the 8th, to Monday, the 15th—holiday for staff.
Really terrible weather conditions this week—rain and gales. Don J. de la Cierva flew to Sea View, Isle of Wight, for lunch on Friday, taking Miss Ruwe, of Los Angeles, as passenger. No aeroplane has landed on the sands at Sea View for at least seven years, so this opportunity was immediately taken by crowds of holiday-makers, who surrounded the machine armed with cameras. The local sales of Kodak films were very much increased. During the week we have had the pleasure of entertaining Mr. H. Pargeter, of the Newcastle Club, and Mr. Lazalet, of the Midland Aero Club. We are always happy to receive visits from the members of any of the clubs.
We had a visit on Sunday, the 21st, of Lieut. Ranald, R.N., and Mrs. Ranald. Mrs. Ranald holds the Royal Aero Club certificate and has now joined this club for the purpose of obtaining her "B" licence.
Total flying time, 16 hrs. 45 mins. Dual, 9 hrs. 50 mins.; solo, 5 hrs. 35 mins.; joy-rides, 40 mins.; tests, 40 mins.
Dual.—Miss M. M. Home, 1 hr. 10 mins.; Lieut.-Comdr. G. W. Woodhouse, 30 mins.; Capt. Molyneux, 25 mins.; Lieut. J. H. P. Graham, R.N., 5 mins.; Messrs. Ellis-Wood, 2 hrs. 10 mins.; N. B. Wells, 50 mins.; W. H. C. Blake, 25 mins.; W. T. J. Stanford, 45 mins.; B. Whittle, 55 mins.; A. L. Fortlage, 45 mins.; W. Clvmo Southcliffe, 45 mins.; H. Pargeter, 15 mins.; T. Williamson, 30 mins.; E. W. H. Dobson, 5 mins.; Crook, 15 mins.
Solo.—Don J. de la Cierva, 2 hrs. 40 mins.; Lieut. J. H. P. Graham, R.N., 10 mins.; Flying Officer H. F. G. Southey, 10 mins.; Messrs. L. A. W. Deane, 20 mins.; K. P. L. Bowen, 30 mins.; R. Sanders Clark, 55 mins.; H. Pargeter, 25 mins.; E. W. H. Dobson, 25 mins.
Joy-rides.—With Flight-Lieut. Thomson : Miss Blake, 10 mins.; Mr. Savage, 15 mins.; Mr. Saunders, 15 mins. With Don J. de la Cierva : Miss Ruwe, 1 hr. 20 mins.; Mr. J. G. Gordon, 10 mins. With Mr. K. P. L. Bowen : Mrs. Portlage, 20 mins.

LANCASHIRE AERO CLUB

REPORT for week ending August 13. Total for the week, 9 hrs. 50 mins. Composed of dual, 3 hrs. 20 mins.; solo, 2 hrs. 50 mins.; joy rides, 3 hrs. 25 mins. Tests, 15 mins.
Dual with Mr. Brown : Messrs. Fisher, Browning, Crossthwaite, Nelson, Scholes, Ward, Allott, Caldecot, Meades.
Solo : Messrs. Anderson, Caldecot, Rowley, Harber, Lacayo.
Joy rides with Mr. Brown : Messrs. Lowe, Cohen, Riley, West. With Mr. Scholes : Mr. Kenyon, Mrs. Mills.
With Mr. Costa : Mr. Conninis. With Mr. Lacayo : Mr. Hartley. With Mr. Leeming : Mr. Heys.
The aerodrome will re-open on Saturday, August 20, having been closed for nine days.

HOLLAND'S FIRST LIGHT 'PLANE CLUB : The example of Great Britain in forming Light Aeroplane Clubs is being followed in other countries. One of the latest to be formed is the "Rotterdamsche Aero Club," and for a start two machines have been purchased. These are Pander biplanes of the type EC, fitted with 60-70 h.p. Walter engines. Their registration letters are H-NADV and H-NADW respectively.

REPORT for week ending August 20 :—The club has been closed for staff holidays and machine overhauls. Flying recommences this week with one Avian and one Moth. The other two machines are held up pending the receipt of a spare engine and spare parts from A.D.C.'s.

Arrangements are well advanced for the flying meeting at Hooton Park aerodrome on September 24. The meeting is organised by the City of Liverpool in connection with their civic week and the flying arrangements are in the hands of the club.

The aerodrome at Hooton Park is probably ideal for the holding of a flying display, with ample accommodation for all machines, 200 acres of good landing surface, easy accessibility to Liverpool, Birkenhead and the Merseyside population generally and a situation which makes it practically impossible to get a good view of the pageant except from the enclosures. Liverpool expects a crowd of 100,000 and this, given reasonable weather, does not seem over-optimistic.

The programme and list of prizes is not yet complete, but the following events have already been definitely arranged :—

(1) High-power handicap for the Liverpool Civic Week Cup (value £50) and stakes of £100. For machines of 100 h.p. and over.

(2) Low-power handicap for the Birkenhead Cup and stakes of £75. For machines with engines not exceeding 5,000 c.c.

(3) Hooton Park handicap, stakes £35. For machines with Cirrus Mark I engines.

(4) The ladies' purse handicap, stakes £40. For all lady pilots.

(5) The Sir Charles Wakefield trophy and stakes of £30. Inter-club landing competition for *ab initio* trained members of the light aeroplane clubs.

(6) The Leeming Challenge Cup and stakes of £30. Inter-club members' race for members of the light aeroplane clubs.

(7) The open handicap race for the Rodman Cup and stakes of £75. Open to any standard British machine.

Where necessary, events will be flown in heats, the winner of each heat receiving a prize of £5.

It will be seen that the total prize list is already in the neighbourhood of £400, excluding the value of the cups to be won outright in events 1 and 2 and the replicas of the cups in events 5, 6 and 7.

We are more than sorry that our open meeting this year should clash with the second meeting of our friends, the Newcastle Club, but the date is not in our hands to fix and the Liverpool authorities inform us that their arrangements are too far advanced for any alteration in the date to be possible.

MIDLAND AERO CLUB LIMITED

REPORT for week ending August 13, 1927.

The total flying time was 9 hrs. 26 mins. The following members were given dual instruction : N. Crand, J. C. Chaytor, G. Robson, R. L. Brinton, R. D. Bednell, Capt. J. Brewin.

Solo : E. R. King, H. J. Willis, R. L. Jackson, S. H. Smith, E. J. Brighton.

On Wednesday, Mr. McDonough flew EBLT to Stag Lane for annual overhaul for renewal of Certificate of Airworthiness.

REPORT for week ending August 20 :—The total flying time was 8 hrs. 14 mins. The following members were given dual instruction : N. Crane, J. C. Chaytor, R. L. Brinton, H. J. Willis, Capt. J. E. Brewin, G. Robson, J. Edwards.

Solo :—W. Swann, C. Fellowes, J. Edwards, G. V. Perry, H. J. Willis.

Extremely bad weather throughout the week restricted flying.

NEWCASTLE-UPON-TYNE AERO CLUB

REPORT for week ending August 7, 1927. Total, 33 hrs. 35 mins.

The following members flew under instruction :—Messrs. Thirlwell, Gibson, De Pledge, L. Middleton, Davey, A. Bell. Solo : Mrs. Heslop, Miss Leathart, Dr. Dixon, Messrs. C. Thompson, Mathews, E. B. Ellis, H. Ellis, Hanney, D. Wilsen, Jewett, Davey, Bainbridge, N. S. Todd, Maxwell, Elmes, J. A. T. Middleton, Capt. Milburn.

Mr. H. O. Pargeter and Mr. L. C. Davy passed the tests for their "A" licences during the week, both putting up excellent shows.

The following flew as passengers with Mr. C. Thompson, Mrs. Fairless and Mr. Knox ; with Miss Leathart, Mrs. Leathart, Mr. Elmes ; with Mr. A. Ball, Miss Bulmer and Miss Klyver.

Report for week ending August 14, 1927. Total time : 41 hrs. 40 mins. Dual, 13 hrs. 15 mins. ; solo, 28 hrs. 25 mins.

Instruction : Mrs. Heslop, Messrs. Maxwell, L. Middleton, Stewart, Wardill, McDougall, J. M. Davidson, Rasmussen, C. E. Shaw, J. M. Kennedy, De Pledge, H. Ellis, Turnbull, D. Wilson, Thirlwell, Sadler, Davey, Fairless, P. L. Lawson.

Solo :—Mrs. Heslop, Miss Leathart, Messrs. Elmes, H. Ellis, W. B. Ellis, Stewart, Maxwell, Wardill, Jewett, McDougall, J. M. Kennedy, Turnbull, C. Thompson, D. Wilson, Thirlwell, Davey, Mathews, Dr. Dixon and Flying Officer Dawson.

The following members passed the qualifying tests for their "A" licences : Mr. D. C. Maxwell, Mrs. Heslop, Mr. Jewett and Mr. D. Wilson, the last three all on the 12th, and all completed the tests in a very satisfactory manner.

Mrs. Heslop is the second lady member to obtain Licence "A" with the club. Miss Leathart, our first lady pilot, flies very regularly and consistently, and there is every promise that our lady members will continue to set a good example to some of the male pilots who appear to have become somewhat lethargic after obtaining their licences. All praise, of course, to the still large proportion who continue to fly regularly.

The following flew as passengers :—With Dr. Dixon, Miss England, Mr. J. Bell ; with Mr. A. Bell, Mr. J. Bell ; with Mr. Turnbull, Miss Klyver ; with Flying Officer Dawson, Mrs. Dawson ; with Mr. Elmes, Mrs. Basil Elmes and Miss Elmes ; with Mr. C. Thompson, Mrs. Fairless, Mrs. Heslop, Mr. Luckman, Mr. Bulmer and Mr. Grundy.

A certain amount of brightening up is going on, and the opportunity has been taken to paint the word "Cramlington" on the roof of the small (Moth) hangar. This can be seen from the air quite a distance away. It will be a further interest to Royal Air Force pilots, club members and private owners, who may pass this way, and who are always welcomed, to know that two petrol pumps are installed on the aerodrome, and quick service can be relied upon. Pratt No. 1 and B.P. aviation mixture is stocked.

We have had the pleasure recently of loaning a wheel and cylinder heads to the Yorkshire Club, in cases of emergency. We know that the Yorkshire Club will be happy to assist us in future as they have done on occasions in the past, but wonder how we will manage to fit Bluebird wings and undercarriages to our Moths should we ever need such parts in a hurry. Perhaps we can between us now fit up one Renault Avro.

The Club's Flying Meeting has now been fixed for September 24.

REPORT for week ending August 21 :—Total time flown, 26 hrs. 25 mins.

Dual with Mr. Parkinson : Messrs. Sadler, Bullock, J. M. Kennedy Leech, Irving, Horne, Wardill, Shaw, Lawson, White, Heppell, Turnbull, Fairless.

Dual with Mr. Simpson : Miss Leathart, Messrs. Shaw, Sadler, Maxwell, Lawson.

Solo : Messrs. Jewett, Bullock, J. M. Kennedy, Maxwell, Wilson, Heppell, Mrs. Heslop.

"A" pilots : Flying Officer Dawson with Mrs. Dawson, Mr. Snowdon, and Mr. McIntyre. Miss Leathart and Miss Slade, Mr. C. Thompson with Mrs. Heslop, Mr. Luckman and Mr. Bulmer, Dr. Dixon with Mr. A. Bell, Mr. Mathews with Dr. Mathews, Mr. Phillips, Mr. Elmes, Mr. Turnbull, and Mr. Stewart all flew alone. Mr. A. Bell with Mrs. Bullock.

Mrs. Fairless flew as passenger with Mr. Simpson. Mr. F. H. P. Simpson, an instructor at the Central flying School, is spending a holiday in the district and comes across to the aerodrome to assist Mr. Parkinson with instruction. Truly a 'busmen's holiday.

All flying was carried out on one machine, Q.V., the second Moth, LX, being under repairs and overhaul for renewal of C. of A. This machine will be flying next week end, probably on Saturday, August 27.

YORKSHIRE AEROPLANE CLUB

REPORT for week ending August 13, 1927. Total flying time, 21 hrs. 50 mins.

Dual with Mr. Beck, 2 hrs. 5 mins. ; dual with Mr. Coles, 7 hrs. 55 mins. ; joy rides, 1 hr. 25 mins. ; solo, 6 hrs. 50 mins. ; tests, 35 mins. ; cross-country, 3 hrs.

The following members took instruction with Mr. Beck :—Miss Woodhead, Messrs. Hirst, Humphries, Bailey, Dujardin.

The following members took instruction with Mr. Coles :—Miss Watson, Miss Woodhead, Messrs. Dujardin, Fitton, Leetham, Crouther, Ellison, Yeomans, Bailey, Little, Mason.

The following members flew solo :—Miss Woodhead, Messrs. Mann, Wilson, Brackenbury, Thomson, Fielden.

Rain has again been the chief performer at Sherburn during the week, but, nevertheless, flying hours to the tune of 21 were put in. We have temporarily lost the loan of Capt. Milburn's machine as it has been flown down to Stag Lane by Capt. Beck for a general look-over.

Our other Moth, which has been away for overhaul, is expected back shortly complete with new wings, tail-plane, undercarriage, and fuselage. We understand that the switch in the rear cockpit did not require renewing.

REPORT for week ending August 20 :—Total flying time, 20 hrs. 45 mins. Dual with Capt. Beck, 11 hrs. 40 mins. Dual with Mr. Coles, 50 mins. Solo, 5 hrs. 55 mins. Cross-country, 2 hrs. Joy-rides, 20 mins.

The following flew with Capt. Beck : Messrs. Bailey, Humphries, R. K. Lax, Stell, Ellison, Miss Watson, Dujardin, Ten Bos, Rhodes, Brown, Tattersall, Yeomans, Milestones, Crouther, Birch.

The following flew with Mr. Coles :—Messrs. Fitton, Mason.

The following members flew solo : Messrs. Thomson, Lax, Clapham, Birch, Rhodes, Brackenbury, Atcherley.

On Tuesday Miss Woodhead passed her tests for her "A" licence, the one bright spot in an otherwise barren week. We are of the opinion that the hull lines of the Moth are capable of considerable improvement, especially in the region of the chine, our experience being that this machine throws up far too much spray in the take-off. This fault has, no doubt, been remedied in the X type.

PROPOSED FLYING CLUB AT LYMPNE

WE have received the following letter from Mr. Dallas Brett, who has been trying to form a light 'plane club at Lympne for some time :—

"As soon as it became evident that the Air Ministry were unable to grant this scheme a subsidy this year, the promoters approached several responsible people in this county in an endeavour to see if any of them were likely to give a substantial start to the subscription list towards obtaining the £3,500 necessary to float the club on a sound basis. It was considered that it was no use appealing to the general public for subscriptions unless promises had been secured from influential people in the neighbourhood of subscriptions amounting to at least sufficient to purchase the club's first machine.

"The result has been so exceedingly disappointing that the promoters have decided to abandon all hope at the present of raising sufficient funds without Government assistance.

"However, we are informed that there is a faint possibility of our project receiving Government support in the next financial year owing to the large demand which has been shown for the club amongst the younger generation in this part of Kent, and it is the promoters' intention to keep the matter prominently before the authorities concerned. In the meantime, if anybody interested in flying in the county wishes to get in touch with any of our members, Mr. Brett will be glad to furnish the names and addresses from our books."

In a subsequent letter we have received, however, Mr. Dallas Brett refers to the new scheme of subsidies and states that their application has now gone in and they hope it will be approved.

Another Private Owner

MR. HOLLINDRAKE, who was Mrs. Eliott-Lynn's companion on her recent air tour across Europe—described elsewhere in this issue—has ordered an "Avian" for his own private use.

FLIGHT

AIRISMS FROM THE FOUR WINDS

Atlantic News

THE Canadian attempt on the Atlantic seems to have got beyond its preliminary difficulties now for the pilots, Capt. Tully and Lieut. Medcalf, have flown their machine to Curtiss Field, Long Island, from London Field, Ontario, to carry out the necessary tests. A crowd of 25,000 cheered them off. They will return to London Field soon, and then essay the ocean flight to our own London as the weather permits.

Air Pageant in Civic Week

DURING Liverpool's Civic Week in September one of the interesting and most promising features will be an air pageant at Hooton Park. There will be six air races, three of them over a 30-mile course round the Wirral peninsula, with Chester as a turning point. The other three races will range over 10 miles. There will be a competition for the best landing for Sir Charles Wakefield's trophy. The R.A.F. will assist at the meeting, which will be very competitive.

The "Whale's" Delay

CAPT. F. T. COURTNEY prepared to start his Atlantic flight on the evening of August 23, but was forced to postpone it again owing to a leak in the petrol gauge. He has decided to change his course now, flying *via* the Azores instead of Ireland.

Round-the-World Flight

ON August 22 a Stinson "Detrioter" monoplane flown by Mr. Edward Schlee and Mr. W. S. Brock started on a round-the-world flight from the Ford aerodrome, flying in the direction of New York. They expect to complete the task in 22 days.

A.A.F. Completes Annual Training

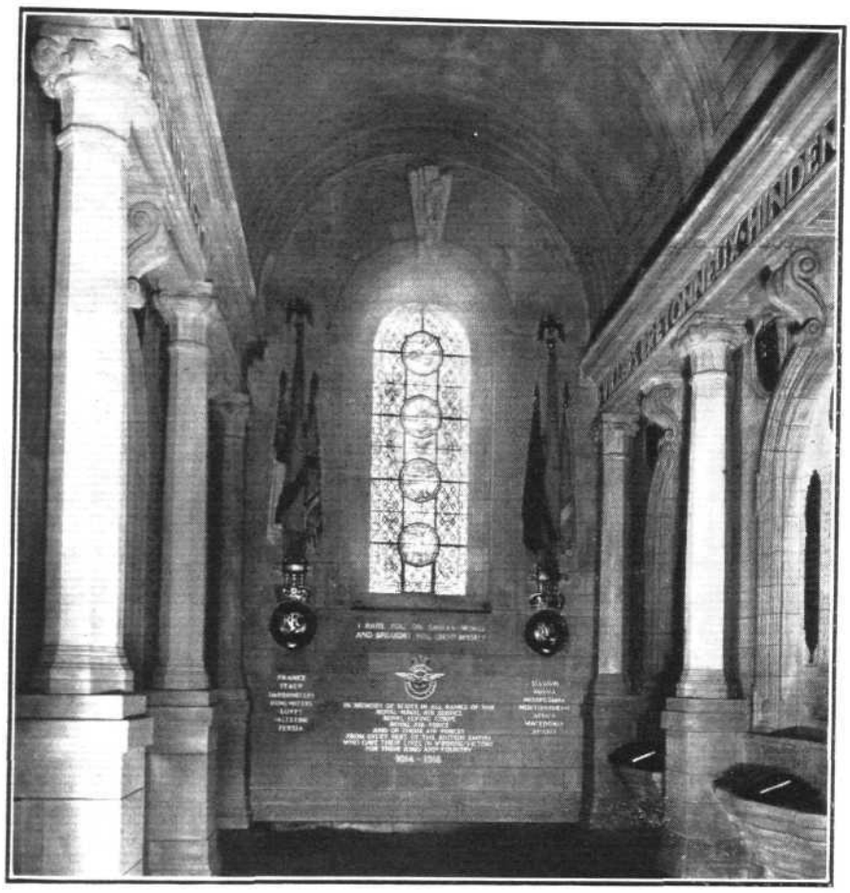
THE Auxiliary Air Force London squadrons, Nos. 600 and 601, completed their annual training on August 21 at Lympne aerodrome. Weather conditions have been very "unfavourable" for much of the time, but this did not deter cross-country flights to Gosport, Old Sarum, Duxford and Martlesham Heath being successfully accomplished. Pilot Officers G. de H. Vaizey and E. J. Earnshaw of No. 600 Squadron obtained their wings, and Pilot Officer H. N. St. V. Norman, of No. 601 Squadron, also obtained his. Air Commodore H. J. Hearson, officer commanding the A.A.F., paid a visit of inspection on August 18.

Col. Lindbergh's Friend Killed

A FRIEND of Col. Lindbergh, Lieut. George Stumpf, was killed in an air crash near St. Louis, U.S.A., on August 20. The pilot, Lieut. C. C. Hutchinson, was seriously injured.

An Aerial Signpost

THE name "Haslemere" is to be marked in white chalk in large letters on the surface of the land at Haslemere to enable pilots to locate the place.



[Photo by Francis Caird Inglis

THE SCOTTISH NATIONAL WAR MEMORIAL: H.R.H. The Prince of Wales presided at the opening ceremony of the Memorial at Edinburgh Castle last month, in the presence of H.M. King George V, H.M. Queen Mary and H.R.H. Princess Mary, Viscountess Lascelles. The Architect of this beautiful monument was Sir Robert Lorimer, A.R.A., F.R.I.B.A. This photograph reveals the "Hall of Honour," looking west in the Shrine, where is seen the exquisite stained glass window, dedicated to the memory of Scots who died for their country whilst serving in the R.F.C., R.N.A.S. or R.A.F. during the War, 1914-18; and of those who served in the other Air Forces of the British Empire.

A Canadian Aero Club?

THE Canadian discussions over their Atlantic flight are bringing about an association of Canadian airmen throughout the country. When the conference, held in London, Ontario, to decide the pilots for the attempt, concluded the unsuccessful applicants returned to their homes in all parts of the Dominion, and organised dinners to discuss the idea of an association. It was received with enthusiasm. The headquarters will be in London, Ontario, and branches in most big centres. A general meeting will follow the start of the Atlantic flight. They hope to work with the Royal Aero Club of this country and other clubs in U.S.A. Commander Erickson, U.S.A., will act as Liaison Officer. Mr. Burns is the originator of the scheme, and Mr. Alan Bruce the hon. secretary.

The Fokker Disaster

THE passengers and pilot in the Fokker monoplane of the Dutch K.L.M. air line which crashed near Sevenoaks, on August 22 probably owe their lives to the fall being partly broken by trees. The mechanic M. Jacobus Brunklaus, of Dordrecht, Holland, was killed, being crushed by one of the engines. The others escaped with minor injuries and shock. Apparently the tail unit became uncontrollable through the fin or rudder coming adrift. The pilot was M. Evert Van Dyk. There were two women among the passengers. The machine had left Croydon about 8 a.m. for Amsterdam and the disaster occurred soon after. It was a new type of Fokker fitted with twin-Bristol "Jupiter" radial air-cooled engines, and designed to accommodate 15 passengers. It had been on the service for two months and had proved very efficient. At the time of writing the exact cause of the crash is obscure.

The Dollar Lure

BOTH success and disaster has marked the Pacific flight from the American coast to Honolulu for the James Dole prizes of £5,000 and £2,000. The first prize was won by Mr. A. Goebel and Lieut. Davis, in their monoplane "Woolaraoo," time 26 hrs. 17 mins. 20 secs., and the second by Mr. M. Jensen and Mr. P. Schulter in their monoplane "Aloha." The "Miss Doran" and the "Golden Eagle" came down in the sea and nothing has been heard of them since. The missing crews are Miss M. Doran, the school teacher, Mr. A. Pedlar and Lieut. V. R. Knope, and Mr. J. Frost and Mr. G. Scott. The "Dallas Spirit" whose first start failed, set off again later, intending to search for the missing crews on the same flight, but wireless messages from it stated that it was crashing in a tail spin, and since then it, too, has been missing. The vast sea area has been widely swept by seacraft and aircraft, but to no avail. On board the last machine were Capt. Erwin and Mr. A. Eichwaldt.

The Air Thief

THE unique theft of an aeroplane is reported from the municipal aerodrome at Troy, Ohio, U.S.A. Two unknown airmen flew off in a machine newly delivered.

U.S.A.-New Zealand Flight

CAPT. GILES came down in a field near Hobart, Indiana, owing to the petrol supply running short. His machine is a product of the Hess Aircraft Corporation.

The Aerial Hearse

THE body of Miss Beatrice Nelson, who was killed while climbing the Alps, was brought from Switzerland to Manchester by air.

London-India Enquiry

AN Imperial Airways director arrived at Constantinople on a mission of enquiry concerning the air route from London to India. An airway passing through Constantinople would shorten the journey by about two days.

A British Success at Zurich Meeting

AT the International Flying Meeting which has just closed at Zurich, Great Britain managed to score a success. Mrs. Eliott-Lynn, who was the only British representative—and incidentally the only woman pilot and owner-pilot participating—was flying her Avro "Avian II" at the meeting, and on August 17 she succeeded in obtaining third place in the light aeroplane race. She also won the Basle Cup for the greatest speed between St. Gall and Basle. We hope to give further particulars of the Zurich meeting in next week's issue of FLIGHT. Mrs. Eliott-Lynn's "Avian," and a D.H "Moth" piloted by Sq.-Ldr. Darwin, were, we believe the only British machines there.

Director of Civil Aviation at Dessau

AIR VICE-MARSHAL SIR SEFTON BRANCKER, Director of Civil Aviation, visited Dessau by air on August 22. The Junkers aircraft works are situated there.

Civil Aviation "Down Under"

THE Federal Government has decided to allocate an additional sum of £200,000 for civil aviation in Australia, bringing the total sum for this object to £315,000. Immediate new services are proposed, one of the first being between Adelaide and Perth. The others will be Camooweal-Darwin : Brisbane-Sydney, and perhaps Melbourne-Tasmania. There is a scheme for bringing the distant parts of the Commo n-wealth within four days' journey of the capitals of the Eastern States, and to circle the whole country with airways.

The Fascisti "Air" Way

ITALY is being asked to offer aeroplanes to the State. The popular subscription has been fixed at five lire per head in the provinces. Signor Mussolini, in a letter to the President of the Italian Aero Club, states that such subscriptions for this scheme must be purely spontaneous and no pressure brought to bear on the community. The Podesta of Milan has sent £112 on behalf of the city.

U.S.A. Protest against Stunt Flying

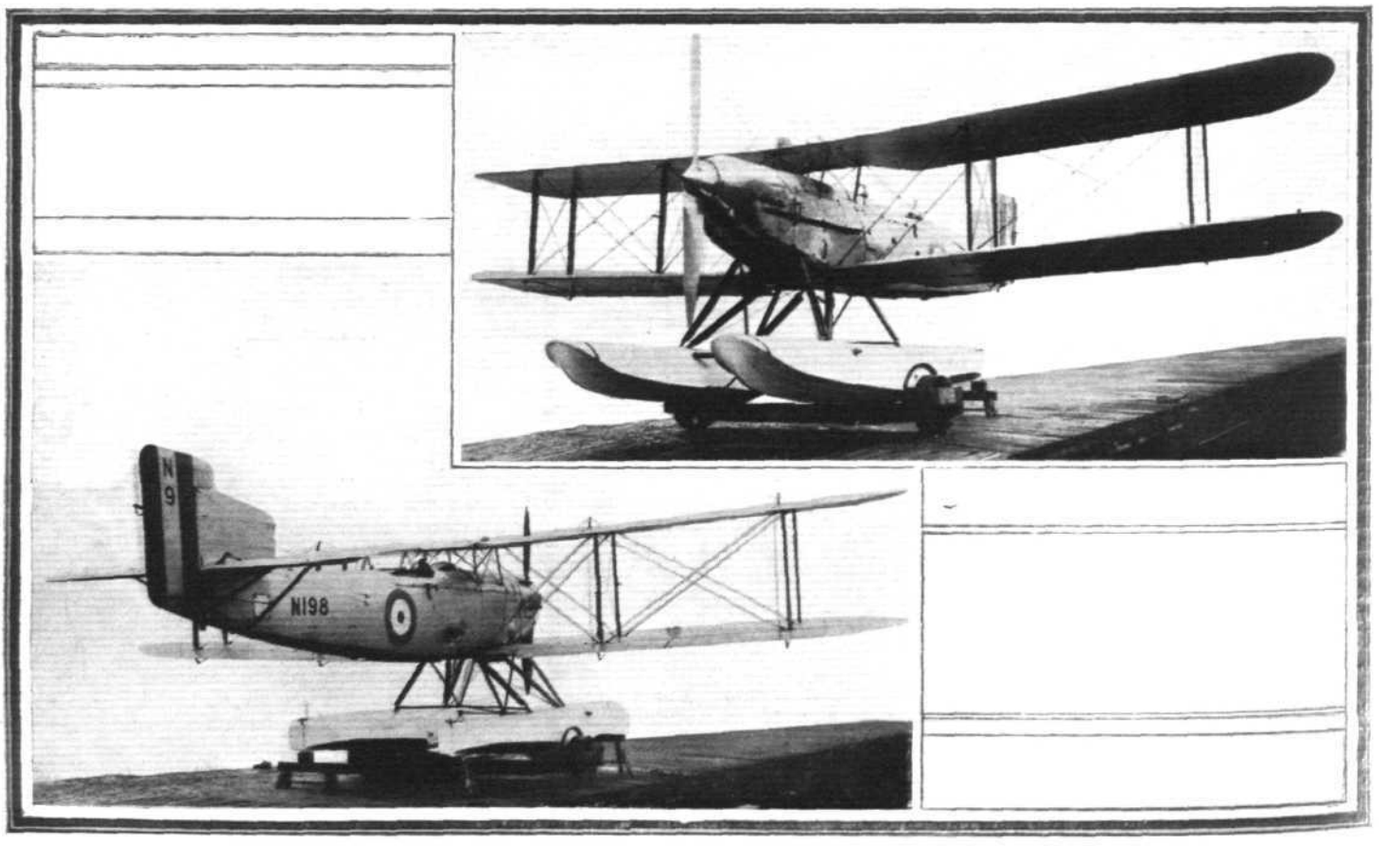
AERONAUTICAL societies in America are protesting against flying stunts over the Atlantic and Pacific unless the machines are subjected to inspection by Government experts. They state that there is no longer any novelty in these flights, and that the chances of success are not good unless the weather is favourable and the airmen have a continuous run of luck.

De Havilland's Magazine

THE issue for August is produced in the usual superior style, being well illustrated and informative. There is an interesting article on their fascinating production, the "Tiger-Moth," and an article by Capt. Broad, A.F.C., on its behaviour in flight.

The R.A.F. Scandinavian Cruise

THE four R.A.F. flying boats which are touring the Baltic arrived at Copenhagen from Oslo on August 19, about 6 p.m. Sir Samuel Hoare—who was on board one of the machines—was welcomed by Sir Milne Cheetham, the British Minister, and Admiral Rechintzer.



A MODERN FAIREY SEAPLANE : Two views of the Fairey III F. seaplane, fitted with a Napier "Lion" engine. This machine is the marine version of the III F. land 'plane type, which was employed on the Cairo-Cape-Cairo Flight this year

FLIGHT
AIRCRAFT ENGINEER AIRSHIPS

THE ROYAL AIR FORCE

London Gazette, August 16, 1927

General Duties Branch

The following Flight-Lieuts. are granted permanent commissions in this rank (July 1) :—J. H. Hargroves, N. V. Moreton.

A. C. Pearson is granted a short service commission as pilot officer on probation, with effect from, and with seniority of Aug. 1, 1927.

The following are granted temporary commissions as Flying Officers on attachment for four years' duty with the R.A.F. (Aug. 2) :—Lieut., R.N.—S. C. Tuke, H. C. Ranald, E. H. Shattock. Sub.-Lieuts., R.N.—J. Brett, G. L. Brinton, O. S. Stevinson, F. W. Bourne, H. H. Caddy, P. D. Heinemann, H. D. Barlow, J. B. Buckley.

Air Commodore E. L. Gerrard, C.M.G., D.S.O., is restored to full pay from half-pay (Aug. 9). The following officers are transferred to the Reserve, Class A :—Flight-Lieuts.—A. W. Clemson, O.B.E., D.S.C. (Aug. 18) ; A. F. Ingram (Aug. 21). Flying Officer.—H. D. Wardle (Aug. 18). Flying Officer H. A. J. de S. Barrow (Lieut., K.O.S.B.) relinquishes his temporary commission on return to Army duty (July 16). The undermentioned Lieuts., R.N., Flying Officers, R.A.F., relinquish their temporary commissions on return to Naval duty :—A. N. Waring (April 12) ; A. B. B. Foulerton (July 30). The short service commission of Pilot Officer on probation A. J. Vaughan is terminated on cessation of duty (Aug. 2).

Stores Branch

Flying Officer L. V. Hirst is granted a permanent commission in this rank, with effect from Oct. 1, 1926, on completion of probationary service.

Medical Branch

The following are granted permanent commissions in ranks stated (Aug. 17) —Flight-Lieut. R. W. White, Flying Officer C. J. S. O'Malley. The following Flying Officers are promoted to rank of Flight-Lieut. :—J. McM. Wilder (Aug. 24) ; F. B. C. L. B. Crawford (Aug. 25).

Flight-Lieut. F. T. Allen relinquishes his temporary commission on account of ill-health (July 12).

Memoranda

The permission granted to Lieut. G. V. Learmond to retain rank is withdrawn on his enlistment in the Army (July 8). The permission granted to 2nd Lieut. G. R. S. Browne to retain rank is withdrawn on enlistment in ranks of R.A.F. (July 12).

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

The following are granted commissions in Class AA as Pilot Officers on probation :—G. B. Falconar (Aug. 1) ; H. P. Fraser (Aug. 2) ; E. A. Buchan (Aug. 3) ; J. H. M. Smith (Aug. 3) ; P. Booth (Aug. 4). The following are transferred from Class A to Class C :—Flight-Lieut. H. M. Ireland, D.F.C. (Aug. 5) ; Flying Officer L. G. A. Kirchner (Aug. 13). Pilot Officer on probation S. O. Tudor is transferred from Class AA to Class C (Aug. 13).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch

Air Commodore E. L. Gerrard, C.M.G., D.S.O., to H.Q., Air Defence Group, pending appointment as Air Officer Commanding, 9.8.27.

Wing Commander G. C. St. P. de Dombasle, O.B.E., to be Inspector of Recruiting, 17.8.27.

Wing Commanders : A. H. Jackson to Station H.Q., Spittlegate, pending taking over command, 17.8.27. W. J. Ryan, C.B.E., to Air Ministry, Directorate of Personal Services, 17.8.27. A. G. R. Garrod, M.C., D.F.C., to H.Q., Fighting Area, Uxbridge, pending posting, 1.9.27.

Squadron Leaders : G. F. Breese, D.S.C., to R.A.F. Depot, Uxbridge, 17.8.27. M. Henderson, D.S.O., to Air Ministry, Directorate of Organisation and Staff Duties, 20.8.27. C. R. Cox, A.F.C., to R.A.F. Depot, Uxbridge, 20.8.27. H. A. Whistler, D.S.O., D.F.C., to No. 55 Sqdn., Iraq, 15.7.27. R. T. Leather, A.F.C., to Air Ministry, Directorate of Organisation and Staff Duties, 15.7.27. J. L. Vachell, M.C., to R.A.F. Staff College, Andover, 15.7.27.

Flight Lieutenants : A. G. Bond, A.F.C., to Air Ministry, Deputy Directorate of Manning, 15.8.27. K. L. Harris to R.A.F. Depot, Uxbridge, 15.8.27. S. B. Harris, D.F.C., A.F.C., to H.Q., Air Defence of Great Britain, Uxbridge, 10.8.27. H. O. Long, D.S.O., to Home Aircraft Depot, Henlow, 1.8.27. A. J. Warwick, H. A. Hamersley, M.C., and F. G. Gibbons, D.F.C., to Home Aircraft Depot, Henlow, 30.7.27. C. Findlay, D.F.C., to No. 55 Sqdn., Iraq, 15.7.27. H. K. Goode, D.S.O., D.F.C., to No. 45 Sqdn., Egypt, 22.7.27. J. N. Boothman to H.Q., Iraq., 16.7.27. L. M. Hilton, D.F.C., A.F.C., to H.Q., Coastal Area, 26.7.27. H. N. Thornton to Central Flying Sch., Wittering, 29.8.27. J. C. Stevens to R.A.F. Base, Calshot, 8.9.27. P. S. Mumford to R.A.F. Depot, Uxbridge, on appointment to a Short Service Commn., 9.8.27.

Flight Lieutenants : T. H. Newton, D.S.C., to Home Aircraft Depot, Henlow, 15.8.27. W. J. Seward to R. A.F. Depot, Uxbridge, 22.8.27. J. W. F. Merer, to R.A.F. Cadet College, Cranwell, 15.8.27. A. H. H. MacDonald to Armament and Gunnery Sch., Eastchurch, 31.8.27. H. W. Evens, to R.A.F. Base, Gosport, 6.9.27. I. Cullen, M.B.E., A.F.C., to No. 1 Flying Training Sch., Netheravon, 1.9.27. R. E. Meek, to No. 21 Group H.Q., West Drayton, 3.9.27. W. J. Daddo-Langlois, to R.A.F. Station, Kenley, 13.9.27. A. W. Franklyn, M.C., to R.A.F. Base, Gosport, 8.9.27. R. Menzies, to School of Army Co-operation, Old Sarum, 30.8.27. A. E. Beilby, to No. 5 Flying Training School, Sealand, 3.8.27.

Flying Officers : L. H. Stewart to R.A.F. Station, Hawkinge, 8.8.27. B. W. T. Hare to No. 602 City of Glasgow (B) Sqdn., Renfrew, 5.8.27. H. M. S. Wright, A. H. Wheeler, W. A. Tattersall, A. W. B. McDonald, J. M. Cohu, G. B. M. Rhind, and J. H. McC. Reynolds, to Home Aircraft Depot, Henlow, 30.7.27. T. Sullivan to R.A.F. Depot, Egypt, 20.7.27. J. W. Rose, D.S.M., to Wireless Station, Ismalia, 1.5.27. A. E. Paish and G. D. Green to Home Aircraft Depot, Henlow, 16.7.27. C. Dollery, M.B.E., to R.A.F. Training Base, Leuchars, 15.8.27. F. R. D. Swain to Home Aircraft Depot, Henlow, 11.8.27. C. R. Mason to No. 39 Sqdn., Spittlegate, 30.8.27.

Flying Officers : T. J. Desmond to Armament and Gunnery School, Eastchurch, 31.8.27. E. E. Fallick and D. V. Ivins, to No. 208 Sqdn., Egypt, 12.8.27. E. C. Delamain, M.C., to No. 502 Ulster (B) Sqdn., Aldergrove, 25.8.27. J. Silvester to No. 1 Flying Training Sch., Netheravon, 14.8.27. K. C. McKenzie, M.B.E., to No. 207 Sqdn., Eastchurch, 3.9.27. R. C. Wansbrough, to No. 4 Sqdn., Farnborough, 30.8.27. C. E. Galpin, to No. 502 Ulster (B) Sqdn., Aldergrove, 1.9.27. E. C. G. Badcock, to R.A.F. Station, Biggin Hill, 30.8.27.

Pilot Officers : G. Stevinson to No. 17 Sqdn., Upavon, 8.8.27. A. C. Pearson to No. 2 Flying Training Sch., Digby, on appointment to a Short Service Commn., 1.8.27. A. P. de Woulf de Wytt to Aircraft Depot, India, 17.7.27. R. C. Greenhalgh to No. 70 Sqdn., Iraq, 14.7.27. H. C. Marett to No. 55 Sqdn., Iraq. 14.7.27. R. J. Stone to R.A.F. Depot, Uxbridge, 19.8.27. E. J. Martin to No. 2 Flying Training Sch., Digby, 9.8.27. P. L. A. Berthon to R.A.F. Depot, Uxbridge, 9.8.27.

Pilot Officers : The under-mentioned Pilot Officers are posted to No. 4 Flying Training School, Egypt, 12.8.27 :—P. G. J. Atkinson, I. B. Beesley, H. Box, F. T. K. Bullmore, R. W. M. Clark, A. R. Combe, H. J. Cross, F. D. Dawson, G. Fachiri, C. E. V. L'E. Feasey, A. R. Grenfell, G. K. Horner, G. R. Jackson, K. F. Jones, D. J. Hughes-Morgan, J. R. Mathews, U. H. Mignon, A. P. Miller, F. W. Murison, F. J. Sarsfield-Sampson, M. G. Sedorski, G. E. E. Singleton, V. S. W. Smyth, B. G. Thompson, O. G. Williams, P. W. M. Wright, and L. M. Woolveridge.

Stores Branch

Squadron Leader F. A. Baldwin, to H.Q., Fighting Area, Uxbridge, 1.9.27.

Flying Officers : C. J. Elliott to R.A.F., Depot, Uxbridge, 7.8.27. F. C. Griffin and F. R. Lines to R.A.F. Depot, Uxbridge, 6.8.27.

Accountant Branch

Squadron Leader A. R. Thomas to No. 1 Stores Depot, Kidbrooke, 26.8.27.

Medical Branch

Group Captain C. E. C. Stanford, D.S.O., M.B., B.Sc., to H.Q., Coastal Area, 16.8.27.

Wing Commander H. M. S. Turner, M.B.E., D.T.M. and H.F.R.S. (E) to Headquarters, Fighting Area, Uxbridge, 22.8.27.

Squadron Leaders : T. J. Kelly, M.C., M.B., B.A., to H.Q., Inland Area, Stanmore, 24.8.27. V. R. Smith to No. 5 Flying Training Sch., Sealand, 5.9.27. E. N. H. Gray, D.P.H., to Home Aircraft Depot, Henlow, 15.8.27. T. McClurkin, M.C., D.P.H., to Pathological Laboratory, Halton, 10.8.27.

Flight Lieutenants : E. G. Howell to R.A.F. Depot, Egypt, 15.7.27. V. S. Ewing, M.B., to R.A.F. Hospital, Halton, 10.8.27.

Flying Officer J. Hill, M.B., to R.A.F. Hospital, Halton, 10.8.27.

NAVAL APPOINTMENTS

The following appointment was made by the Admiralty on August 10 :—

Lieut. (Flying Officer, R.A.F.).—C. W. Byas, to Ross, addtl., for S/M. M2, and for full flying duties with School of Naval Co-operation, Lee-on-Solent (June 27).

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ROYAL AIR FORCE RIFLE ASSOCIATION

THE Seventh Annual Meeting of the above Association was held on the Siberia Ranges, from June 27 to July 1, 1927.

The entries in most classes show a marked increase on former years, especially in the Team Match for the Chief of the Air Staff's Cup, there being 20 teams entered against 15 last year. The Pistol Team Match for Sir John Salmond's Cup also showed an increase in entries, there being 12 teams as against 8 in 1926.

The following is an approximate comparison of individual entries for 1926 (in brackets) and 1927 :—

R.A.F. Rifle Championship.—(131) ; 150 ; Aperture Sight Match.—(46) ; 51 ; Young Airman's Match.—(50) ; 45 ; Tyro Match.—(130) ; 140 ; Pistol Match.—(42) ; 45 ; Revolver Match.—(30) ; 21 ; Total for 1926 = 429, and for 1927 = 452.

The following shows the winners in the Chief of the Air Staff's events :—

C.A.S.'s Rifle Team Cup (open to teams of eight from any Unit).—Winners : R.A.F. Base, Gosport. The Cup, 1 large Silver and 9 medium Bronze Medals ; score, 1033. 2nd : R.A.F. Base, Calshot, 1 large Bronze Medal ; score, 1030. 3rd : Electrical and Wireless School, Flowerdown ; score, 1024.

Sir John Salmond's Pistol Team Cup.—(Open to teams of four from any Unit)—Winners : Armament and Gunnery School (Eastchurch), The Cup, 1 large Silver and 4 medium Bronze Medals ; score, 402 ; 2nd : R.A.F. Cadet College (Cranwell), 1 large Bronze Medal ; score, 365. 3rd : R.A.F. Base (Calshot) ; score, 336.

The Longcroft Tyro Cup.—(Open to all ranks who have never won a money prize at a R.A.F.R.A. Meeting).—Winner : Cpl. Colson (Uxbridge), The Cup, medium Silver Medal and £2 ; score, 99. 2nd : F/Sgt. Bould (Gosport), The medium Bronze Medal and £1 ; score, 94. 3rd : Cpl. Arrow (Gosport), 15*s.* ; score, 94. And 11 other money prizes.

The Whitelock Young Airmen's Cup (open to all ranks under the age of 25).—Winner, L.A.C. O. McNair (Henlow), The Cup, Medium Silver Medal and £2; score, 166. 2nd, L.A.C. J. Christian (Manston), medium Bronze Medal and £1 10*s.* ; score, 149. 3rd, L.A.C. Huxley (Sealand), £1 ; score, 140. And 14 other money prizes.

The J. C. Halahan Cup Aperture Sight Match (open to all ranks using open or aperture sights).—Winner, Cpl. A. W. Hulse (Cranwell), The Cup, medium Silver Medal and £3 ; score, 143. 2nd, Sq.-Ldr. J. K. Wells (Air Ministry), medium Bronze Medal and £1 10*s.* ; score, 141. 3rd, Sgt. T. Cresswell (Halton), £1 ; score, 141. And 17 other money prizes.

The Duke of Sutherland's Cup Grand Aggregate and Rifle Championship
First Stage

Match I. 600 *yards Deliberate.*—1st, Wing-Comdr. S. Grant-Dalton (East

church), £2; score, 49. 2nd, Cpl. Davis (Gosport), £1 10s.; score, 45. 3, Flt.-Sgt. Lyon (Flowerdown), £1; score, 44. And 13 other money prizes.

Match II. Fire with Movement, 600 yards to 100 yards.—1, L.A.C. J. Christian (Manston), £2; score, 47. 2nd, Sqd.-Ldr. Hon. R. A. Cochrane (Andover), £1 10s.; score, 45. 3rd, S.M.2 G. Currie (Halton), £1; score, 44. And 13 other money prizes.

Match III. Rapid, 300 yards.—1st, Sgt. Church (Calshot), £2; score, 44. 2nd, L.A.C. O. McNair (Henlow), £1 10s.; score, 42. 3rd, Flt.-Lieut. W. E. Staton (Calshot), £1; score, 41. And 13 other money prizes.

Match IV. Snapshooting, 300 yards.—1st, Sgt. King (Halton), £2; score, 45. 2nd, L.A.C. F. Hazell (Shrewsbury), £1 10s.; score, 45. 3rd, Sgt. T. Cresswell (Halton), £1; score, 43. And 13 other money prizes.

Aggregate Winner for the First Stage.—L.A.C. O. H. McNair (Henlow) Bronze Medal; score, 166.

Second Stage

Open to the 40 competitors with the highest aggregate in the First Stage. Conditions as for the First Stage, and First Stage scores to count.

Winner, F/O S. Wallingford (Calshot), The Cup, N.R.A. Silver Medal, the large R.A.F. Silver Medal and £5; score, 314. 2nd, Flt.-Lieut. W. E. Staton (Calshot), The R.A.F.R.A. Bronze Medal and £3; score, 311. 3rd, Cpl. A. W. Hulse (Cranwell), £2; score, 300. And 5 other prizes of £1 each.

The Barton Revolver Championship XX Cup. First Stage.—Winner, Wing-Comdr. S. Grant-Dalton (Eastchurch), the R.A.F.R.A. Bronze Medal; score, 257.

Second Stage.—Open to 20 competitors with the highest aggregate in the First Stage.

Winner, Wing-Comdr. S. Grant-Dalton (Eastchurch), The Cup, the R.A.F.R.A. large Silver Medal and £3; score, 160. 2nd, Flt.-Lieut. W. E. Staton (Calshot), The R.A.F.R.A. Bronze Medal and £2; score, 158. 3rd, Wing-Comdr. R. J. F. Barton (Duxford), £1; score, 52. And 5 other money prizes of 10s. each.

The F. C. Halahan Pistol Championship Cup.—Winner, Wing-Comdr. S. Grant-Dalton (Eastchurch), The Cup, the N.R.A. Bronze Medal, the R.A.F.R.A. Silver Medal and £3; score, 125. 2nd, Flt.-Lieut. W. E. Staton (Calshot), The R.A.F.R.A. Bronze Medal and £2; score, 118. 3rd, Flt.-Lieut. R. S. Greenslade (Cranwell), £1; score, 117. And 5 other money prizes of 10s. each.

At the conclusion of the rifle competitions the prizes were distributed in the Umbrella Tent by Marshal of the Royal Air Force Sir Hugh M. Trenchard, Bart., G.C.B., D.S.O., who, in the course of his remarks, stated that the accuracy necessary for marksmanship was also essential in every detail of the flying service. He would do all he could to encourage this important branch of service sport, and congratulated the Chairman Air Commodore F. C. Halahan, C.M.G., C.B.E., D.S.O., M.V.O., and the Secretary, Flight-Lieut. J. L. K. Pearce, O.B.E., for organising such an excellent meeting, and for their enthusiasm and hard work in making the R.A.F. Rifle Association a success. The Chairman, on behalf of the Committee and members of the Association, thanked the Chief of the Air Staff for distributing the prizes. The Chief of the Air Staff and his staff were entertained to lunch with the members of the Association in the R.A.F. Officers' Mess at Bisley, the Secretary of the National Rifle Association also being present.

N.R.A. BISLEY MEETING, JULY 4 TO 16, 1927

The following is a brief summary of the results of Service teams and individuals at the above meeting.

United Services Cup (open to teams of 8 from the Fighting Services).—Captain of Team, Flight-Lieut. J. L. K. Pearce, O.B.E. (Cranwell). Sgt. A. Worden (Eastchurch), 165; Flt.-Lieut. A. E. Dark (Eastchurch), 158; Cpl. A. W. Hulse (Cranwell), 157; S.M.2 S. Hilliard (Halton), 155; F/O.S. Wallingford (Calshot), 152; Flt.-Lieut. E. C. Emmett (Eastchurch), 143; S.M.2 B. Earl (Flowerdown), 142; Flt.-Lieut. W. E. Staton (Calshot), 136. Total, R.A.F., 1,208. Reg. Army, 1,320. Royal Marines, 1,303. Terr. Army 1,291. Royal Navy, 1,275.

Inter-Service S.R. (b) XX Match. (Open to teams of 20 from the Fighting Services).—Sgt. T. Cresswell (Halton), 146; Cpl. A. W. Hulse (Cranwell), 144; S/L. J. K. Wells (Woolwich), 140; F/Lt. A. E. Dark (Eastchurch), 138; Sgt. A. Worden (Eastchurch), 137; F/L. J. L. K. Pearce (Cranwell), 136; A/C. F. C. Halahan (Cranwell), 136; W/C. R. J. F. Barton (Duxford), 136; F/O. E. J. Wright (Halton), 136; F/O. S. Wallingford (Calshot), 136; F/Lt. C. W. Hill (Henlow), 136; F/S. R. J. Williams (Eastchurch), 135; F/Lt. C. E. Cullen (Shrewsbury), 134; G/C. R. P. Ross (Flowerdown), 133; F/L. E. C. Emmett (Eastchurch), 132; L.A.C. O. H. McNair (Henlow), 132; F/L. J. W. Lissett (23 Group), 132; F/S. C. H. Spry (Cranwell), 131; Cpl. Whiting (Eastchurch), 130; S.M.1. J. A. Kerr (Shrewsbury), 129. Total, R.A.F., 2,709.

Match Scores.—Ter. Army, 2,745, 1st; Reg. Army, 2,737, 2nd; R.A.F., 2,709, 3rd; R. Marine, 2,677; R. Navy, 2,676; R.N.V.R., 2,342.

The Whitehead Revolver Cup. (Open to teams of 8 from the Fighting Services).—W/C. R. J. F. Barton (Duxford), 91; F/L. C. W. Hill (Henlow), 88; F/O. S. Wallingford, (Calshot), 85; F/L. W. E. Staton (Calshot), 79; W/C. Grant-Dalton (Eastchurch), 78; F/L. A. E. Dark (Eastchurch), 73; A/C. F. C. Halahan (Cranwell), 71; Sgt. A. Worden (Eastchurch), 71. Total, R.A.F., 636; Royal Navy, 677; R. Marine, 663; Reg. Army, 641; R.A.F., 636.

International honours were awarded to the following:—Elcho Challenge Cup (Match Rifle).—F/L. J. L. K. Pearce. Mackinnon Challenge Cup, F/L. J. L. K. Pearce, Sgt. T. Cresswell. National Match. Representing.—F/L. J. L. K. Pearce (Ireland); Sgt. T. Cresswell (Wales); F/S. R. J. Williams (Wales); W/C. R. J. F. Barton (Scotland); G/C. R. P. Ross (Reserve—Scotland).

Champion Shot of Island.—Flight-Lieut. J. L. K. Pearce, O.B.E. He is awarded the Irish Gold Jewel. The undermentioned were successful in gaining their places in His Majesty the King's Prize, Final Stage, and were placed as follows, being awarded the King's Silver badge and money prizes:—Winners Score, 292; F/Lt. J. L. K. Pearce (Cranwell), 16th, 285; F/O. S. Wallingford (Calshot), 276; Sgt. T. Cresswell (Halton), 276.

The Prince of Wales Prize.—2nd F/L. J. L. K. Pearce (Cranwell), score, 98 (ex 100).

The Grand Aggregate and Bisley Rifle Championship.—10th, F/L. J. L. K. Pearce (Cranwell), the N.R.A. Bronze Cross.

The Service was well represented in most of the prize lists at Bisley, some remarkably fine scoring being registered by Group Captain R. Peel-Ross, who won money of the Class "B" and "C" events. Wing Commanders Barton and Grant-Dalton and Flying Officer S. Wallingford won revolver spoons, and were in many of the revolver prize lists. It is hoped that in future years the R.A.F. Meeting will be held a month earlier, so that the date will not clash with the Aerial Display. It is considered that by advancing the date of the meeting there will be a much greater number of entries, and that every shot will be given a chance of competing. It is also proposed to offer a "Squadron Challenge Cup" for rifle shooting in future years, open to teams of four from squadrons only. In this way, it is hoped to make all squadrons interested in the work of the Association.

AIR MINISTRY NOTICES

Night Flying with Forward Navigation Light Extinguished

PILOTS are warned that until further notice Royal Air Force aircraft will, in the conditions detailed below, be flying at night with the forward navigation light extinguished:—

(*a*) When flying N. of the River Thames or W. of the longitude of Croydon.
(*b*) When flying S. of the River Thames and E. of the longitude of Croydon after attaining a height of 3,000 ft.

Monthly List of Notices Cancelled.

The following Notices or parts of Notices are cancelled:—

General.—1926.—Nos. 12, 50, 59, 64, 70. 1927.—Nos. 12, 36, 39—paras. 1 and 3, 54—paras. 1 and 2, 58, 59, 60.
Belgium.—1926.—No. 66—para. 1.
France.—1926.—Nos. 62, 66—para. 2 (Commercy), 74.
Holland.—1926.—No. 4. 1927.—No. 15.

(No. 64 of 1927.)

Lympne Aerodrome: Parachute Descents

Notice to Airmen No. 62—Corrigendum.

IT is hereby notified:—

Parachute descents will be carried out during calm weather at Lympne Aerodrome between August 15 and 20, 1927, both dates inclusive.

Pilots are, therefore, warned to keep a good look-out when approaching this aerodrome.

(*Confirmation of W/T Signal of August 12, 1927.*)

Corrigendum.

The position of Calshot Air Gunnery and Bombing Range is Lat. 50° 48' 30" N., Long. 1° 18' W. Notice to Airmen No. 62/1927 should be corrected accordingly.

(No. 65 of 1927.)

PUBLICATIONS RECEIVED

Report of the Aeronautical Research Committee for the Year 1926-27. H.M. Stationery Office, Kingsway, London, W.C.2. Price 2*s.* net.

Illustrated Poster. The International Aero Exhibition, Copenhagen, Denmark.

Revue Juridique Internationale de la Locomotion Aerienne. July, August, September, 1927. Per Orbem, 4, Rue Tronchet, Paris. Price 75 fr.

Airworthiness Handbook for Civil Aircraft. Amendment List No. 1 to Air Publication 1208. July, 1927. H.M. Stationery Office, Kingsway, London, W.C.2. Price 3*d.* net.

Aeronautical Research Committee Reports and Memoranda. No. 1053 (*E.* 22).—Torsional Vibration in Engines: Effects of Fitting a Damper, a Flywheel, or a Crankshaft-driven Supercharger. By B. C. Carter. February, 1926. Price 1*s.* 9*d.* net. *No.* 1082 (*Ae.* 261).—The Pressure Round a Cylinder Rotating in an Air Current. By A. Thom. November, 1926. Price 9*d.* net. H.M. Stationery Office, Kingsway, London, W.C.2.

AERONAUTICAL PATENT SPECIFICATIONS

(*Abbreviations*: Cyl. = cylinder; i.c. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

APPLIED FOR IN 1926

Published August 25, 1927

11,473. N. S. MUIR. Control system for aircraft. (274,973.)
19,637. VICKERS, LTD., and E. E. F. BERGER. Combustible compositions for smoke producing, etc. (275,021.)
21,588. C. S. BRAGG and V. W. KLIESRATH. Servo-motors. (260,220.)
32,345. SPERRY GYROSCOPE CO. Gyroscopic compasses. (265,554.)

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